Volume II

PAYLOAD CARRIER SIMULATOR MAN/SYSTEMS PROGRAM INTEGRATION

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PHASE B

VOL. II A

BITS USERS MANUAL

(BINARY INTERVAL TIME SAMPLING)

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PHASE B/VOL II A

BITS USERS MANUAL

1.0 GENERAL DESCRIPTION

1.1 Characteristics of the BITS Procedure

The Binary Interval Time Sample (BITS) observation procedure is designed to provide a detailed record of a broad and balanced spectrum of the activities of one or more confined individuals. This procedure yields a balanced set of data about all of the activities of the individual, rather than a weighted sample concentrating on certain behaviors. As a result it is optimally suited for the situation in which there are many different questions to be asked about the individuals' activities, or in which many of the questions are to be asked after the observations are completed. The structure and operation of the procedure make possible very detailed records of the activities since the human observer is engaged primarily in focusing on the observed activities. This system makes it unnecessary for him to concentrate on remembering categories or making ill-defined discriminations.

The BITS procedure is a time sample observing procedure in the traditional sense that the observations are made and recorded at regular, preestablished times rather than at those times when some particular event occurs. If observations are made frequently enough and over a long enough period of time to produce adequate averaging, conclusions can be reached about the frequency and duration of activities, and about the relative amount of time allocated to various activities.

The BITS procedure is a unique time sampling observation procedure in that its structure contributes to greater resolution or detail in recording the observed activities, while its content provides

a means to ensure that the set of activities noted and recorded is inclusive and general. Both structure and content contribute to high reliability and validity of the observations.

The BITS procedure is centered around a set of binary decision trees. Each tree is focused on one kind of function of the behaving individual, and asks progressively more detailed questions about the use of that function during the instant of observation. The functions reflected in the major decision trees are:

(1) The location of the individual within the observed area.

(2) The status of the whole body of the individual.

(3) The use of the eyes of the individual.

(4) The kinds of stimuli available to the ears of the individual.

(5) The use of the hands of the individual.

(6) The type of communication in which he is engaged.

(7) The content of the communication in which he is engaged.

There are four primary criteria for the effective design of each of these trees. First, the contents of each decision point or branch should be functionally symmetrical. Each of these two choices at a branch should divide the remaining activities into approximately equal halves. Second, the choices at each branch should pertain to directly observable activities rather than to inferential categories. Third, the choices in the tree should be adapted to the specific setting

being observed. Rather than using all purpose terms, the decision words should reflect the actualities of the specific situation. Fourth, the resolution of the trees should be adjusted to the limitations of the observation facilities. Reliability is decreased where branches of trees call for finer discriminations than the observers can actually make.

1.2 Characteristics of The BITS Data

The data may be characterized as being comprehensive, balanced, and detailed. They are not gathered in response to any hypothesis or set of hypotheses, and as a result are not limited to a restricted subset of activities related to a predetermined set of questions. Rather, they are designed to cover all activities and types of activities in a balanced fashion. The data exist as a series of numeric records, one for every tenth of an hour during the mission. Each record contains an acutely resolved image of each crewman's activities at the time of that sample. These data then may be examined with innumerable operationally stated questions.

Basically, these questions may be considered in two classes, reconstruction and proportionality. Reconstruction questions call for the description of the activities occurring at a particular time, or surrounding a particular event. In such cases the description extracted from the data can range from the specific detail of all of the activities of all of the crewmen at a specified time, to less detailed information about one type of activity for one crewman (e.g. was crewman "A" reading at that time?) The proportionality question

inquires into the proportion of time allocated to specified activities during a specified time frame. The time frame can include the entire run or be limited to certain times, or include only those times when other specified activities were occurring (e.g. what percent of the time that crewmen were in the GPL were they reading?). Broader proportionality questions are composed by asking compound questions. The following is an example of such a question. What percent of the time did crewman "A" have (eyes on nonscience books, or eyes on nonscience other reading, or eyes on T.V, or eyes on other entertainment, or hands on recreation item, but hands not on science object or equipment, and not engaging in science related communication. This would be one of many possible questions about leisure activities.

2.0 HARDWARE REQUIREMENTS

2.1 Onboard Hardware

2.1.1 Onboard Video System

The principal requirement of the onboard video camera system is that camera coverage be provided for all areas used by crewmen, except those areas where privacy is required (optimally only the head, although if privacy is permitted in the head, data relevant to head design and procedures cannot be collected). This general coverage may be best provided with cameras with wide angle lenses directed into overhead mirrors positioned to provide relatively flat overhead coverage of a general area. The optimal focus distance is about 3 feet from the floor. The optimal width of field includes all points in the area 3 feet above the floor. If light levels in the area are adjustable, attention must be given to establishing a lens setting which will provide an image at those light levels likely to be used. In order to minimize the "big eye" or "big brother" effect, cameras with remote movement capability should be used only in experiment areas.

In the experiment area of the GPL, in addition to cameras covering the general area from overhead, cameras should be positioned for each experiment to provide maximum resolution of the operating area of that experiment with minimal obstruction of the view by the crewmen themselves.

2.1.2 Onboard Audio System

The principal requirement of the onboard microphone system is that it provide a maximal signal to noise ratio throughout all areas of the PCS. This requirement does not include high fidelity, so that a larger number of moderately priced microphones is usually more effective than fewer expensive microphones. Well positioned microphones with limited directionality are more effective than omnidirectional microphones, since the former reduce reflected general noise. As a preliminary recommendation, it is suggested that one microphone be located at each experimental station in the GPL, one microphone in each stateroom, and three in the wardroom. All microphones should have moderately cushioned mountings.

By far the most effective audio pickup system is provided by personal microphones worn continuously by each crewman. Such microphones should be lightweight, small lavaliere or tie clip microphones, connected to a lightweight battery operated FM transmitter which attaches to the crewman's belt. This system requires an onboard FM antenna system which feeds to FM tuners located outside. Each transmitter is tuned to a separate wavelength. Attention must be given to any interference this system would cause in onboard control and experiment requirements.

2.2 Control Room Equipment

2.2.1 Control Room Video System

Video monitors should provide continuous pictures from the general coverage cameras of the GPL and wardroom. Additional monitors

may be part of a switching network via which any one of them may provide a picture from any other onboard camera in the CPL or in staterooms. General coverage video monitors should be located just below the eye level of the seated observer with the other monitors as low as possible above the bottom row.

2.2.2 Control Room Audio Equipment

FM tuners for the onboard FM personnel microphones should be located within easy access in the control room since they require relatively frequent adjustment. Each tuner and each hardwired onboard microphone should be wired to a level control and isolation state at a master panel in the control room. One output of each of these stages is connected in parallel, forming a mixed line. This mixed line is fed via a defeatable automatic volume control (AVC) and compressor stage to a tape recorder (very large reels, 1 7/8 ips). This line, as well as one output from each microphone isolation state, is fed to three selector switches. Each selector switch is fed via a defeatable AVC and compressor to an amplifier state, which has level and tone controls. These ampliflier stages should output to sets of earphone jacks, with one ampliflier also connected to a speaker. A variety of good quality, impedance matched earphones and earplugs should be provided. The controls and plugs should be mounted horizontally at the rear of a horizontal work surface just below the bottom row of video monitors. The control room intercom should be modified to allow listening to the watch director side of all crew communication with him.

2.2.3 Control Room Computer Console

The requirements of this system are that the terminal consist of a cathode ray display and a keyboard similar to a TTY keyboard. The display must be capable of a 12 line, 80 character per line display which can be filled at 9600 BAUD. The terminal should be located at one end of the bank of video monitors at a sideways angle of approximately 45^{o} to them, with the keyboard at approximately 27" above the floor.

3.0 BITS PERSONNEL REQUIREMENTS

The BITS observers are the personnel making the Time Initiated Observations under the direction of the UAH Man/ Systems Coordinator. The same people could be used to carry out the functions described under Event Initiated Observations. A general requirement of all of these observers is that they have a sense of professionalism or objectivity regarding the behavior of the people they are observing. This objectivity is enhanced by serious study in the field of psychology. It is also beneficial for them to have had previous experience in the design and execution of isolation experiments. This experience provides an awareness of the relevant aspects of the activities they are observing. It is also required that they go through the training procedure described in 5.0.

During a run, two BITS observers should be on duty at all times. One of these observers will be actually executing the BITS procedure while the other assists. The two observers should rotate duties approximately every two hours. Observers should be on duty 6-8 hours each day. Duty shifts should be staggered so that both observers are never rotated simultaneously, so that continuity is provided.

It is anticipated that if the same people were to carry out the Event Initiated Observations, it would only be necessary to increase the on duty personnel to three, if all of these functions were located in the same room.

4.0 REAL TIME BITS OPERATION SOFTWARE SPECIFICATIONS

4.1 Program Sequence Description

During an observing sequence, which is initiated by the six minute clock, the observer makes a number of binary choices which describe the activity of each of the crewmen. These binary choices are arranged in logical sequences so that the sets of choices regarding a particular kind of activity form a binary logic tree. At the beginning of the tree, that is at the first branch, a choice is made as to which of two logical halves of an activity type the crewman is engaged in. The choice made at the first branch determines the choice available at the second branch, so that the observer steps progressively toward an end-point in the tree. Each successive branch thus represents a greater degree of resolution in the description or recording of an activity. Since each tree is a progressive series of choices about one kind of activity, there are a number of trees, all logically identical, but different in content. After stepping through successive branches of each activity tree for one crewman, the observer repeats the same procedure for each of the other crewmen being observed. As the final step in the overall sequence the observer indicates, using the numbers 1-7, his estimate of the state and of the productivity of each of the crewmen. The system then remains in "wait" status until the next observing sequence is initiated by the clock.

The display terminal is used to direct the observer through the total sequence by displaying to him the current time, the name of the crewman whose activities he is currently recording, the

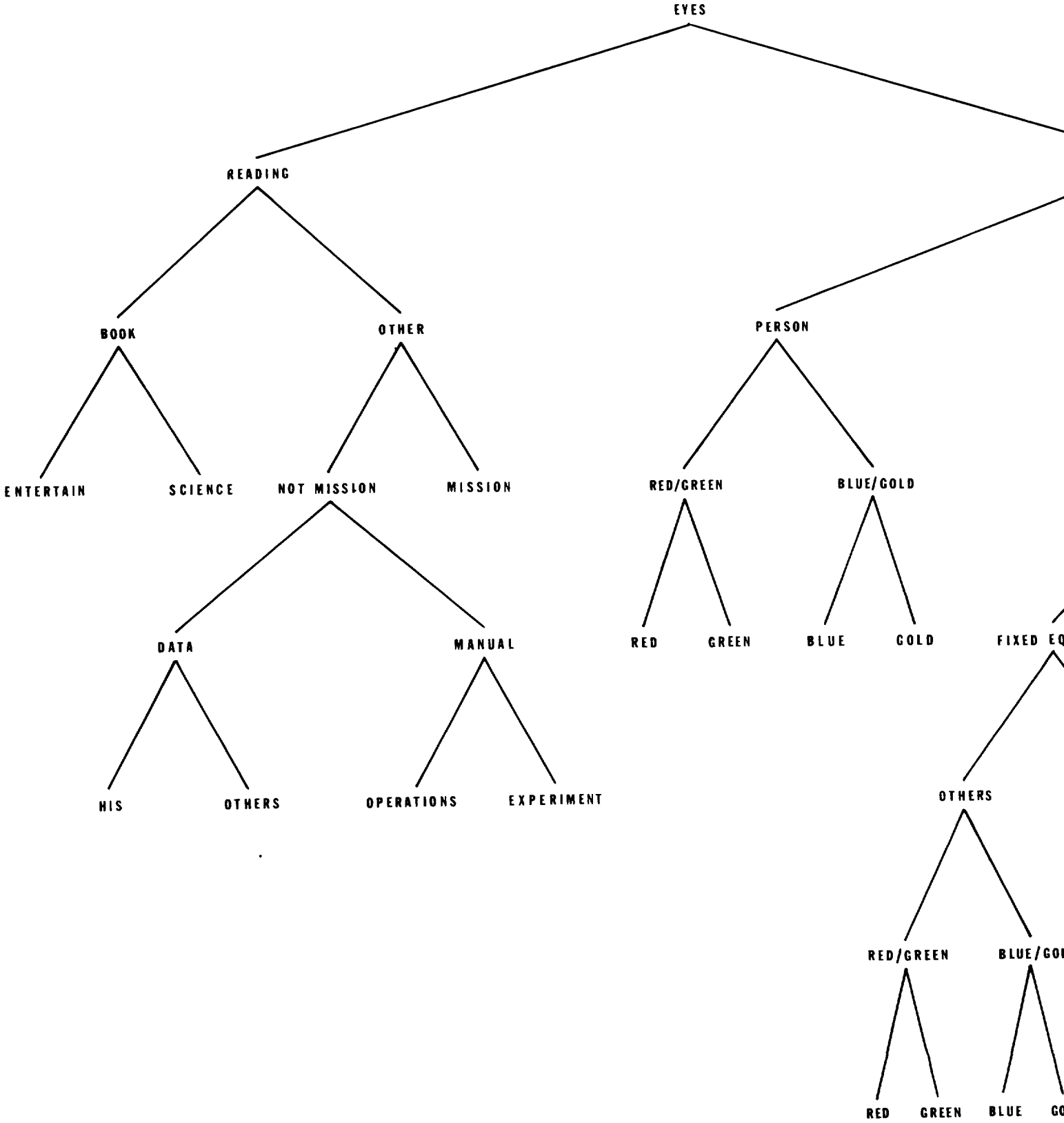
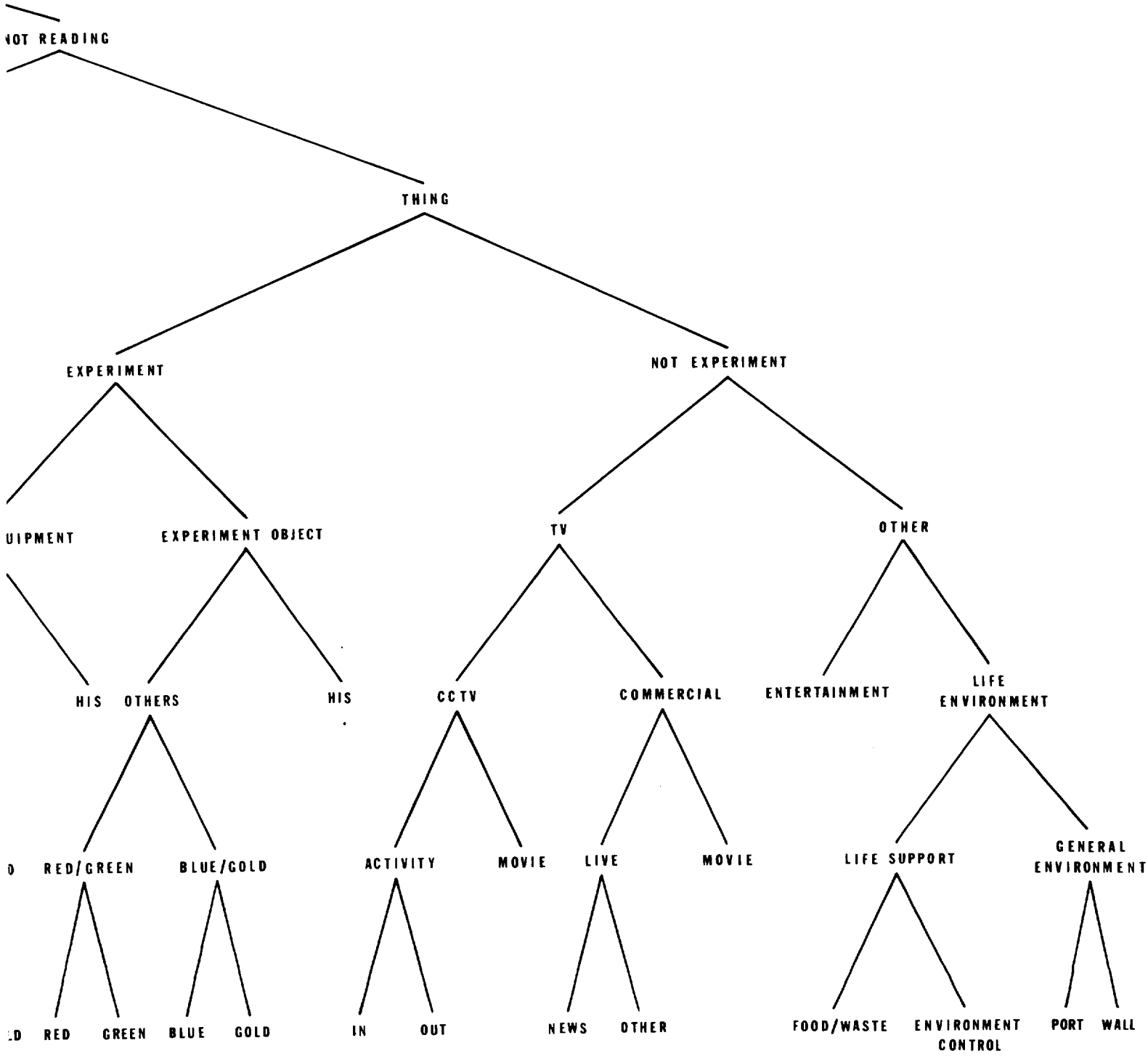
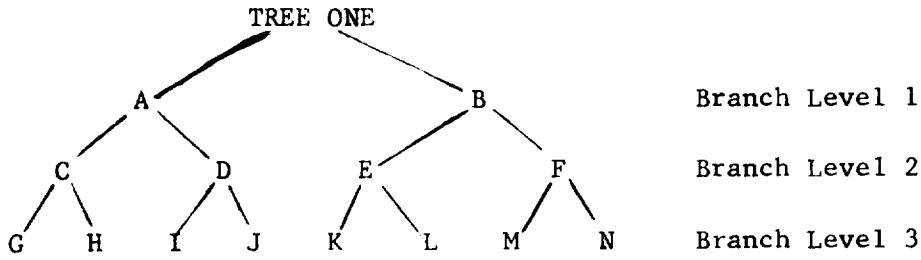

EYES
READING
BOOK
OTHER
PERSON
ENTERTAIN
SCIENCE
NOT MISSION
MISSION
RED/GREEN
BLUE/GOLD
DATA
MANUAL
RED
GREEN
BLUE
GOLD
FIXED EQ
HIS
OTHERS
OPERATIONS
EXPERIMENT
OTHERS
RED/GREEN
BLUE/GOL
RED
GREEN
BLUE
GO

FIG. 1 AN EXAMPLE OF A FILLED TREE.



name of the activity tree he is currently stepping through, and the choices he may make at the current branch. He indicates his choice of the binary possibilities by depressing either the "Z" or the "/" character of the terminal keyboard.

The following is a simplified formal example:



At branch level 1 either A or B may be chosen. If A is chosen, then the choice at branch level 2 is between C and D. If D is chosen, the choice at branch level 3 is between endpoint I and endpoint J. Once the third choice is made, the tree is exhausted and TREE TWO would be presented and worked through, (also see Fig. 1).

In the simple case, the program, in addition to directing the observer through the larger sequence of steps, uses the observer's choices at each branch level to select and display the logically following branch at the next branch level. Based on these selective choices, a data "word" is built. The data output of this program consists of a series of data records accumulated in mass storage and finally stored on magnetic tape compatible with the Univac 1108 system. Each data record consists of three major parts: 1. the runtime at the time of the observation period, 2. the data words built during the sequencing through trees, 3. the data word storing the state and productivity numbers. The format and structure of these elements of the data records

are constrained only by the necessity of compatibility with the 1108, since the analysis program will transform the data from 1108 mass storage files.

In addition to the direct pathway through the overall observing sequence, there are certain contingency pathways:

HOLD - While all crewmen are sleeping the activities do not change between observations. The observer may therefore shift the program to "hold" status, during which time the program will not initiate an observing sequence, but will instead continue to record the data record built during the last active observing sequence, with an updated runtime. The observer may shift out of the "hold" mode at any time, whereupon the program will sequence normally at the next clock initiated period.

SKIP - The observer may "skip" one crewman entirely during an observing period. The program will not progress through the trees sequence for that crewman during that observation, but will record the data word for that crewman which was built the last time he was not skipped.

RETRACE - If the observer discovers that he has made an error, he may call for "retrace," which resets the program sequence to the beginning of the sequence for the preceding crewman. In this case, the new data will overwrite the data word just built. The program sequence will continue forward as if this were the first entry into this part of the sequence.

PRUNE (as in cutting back) - In those cases where the observer cannot make exact enough observations to continue further from some branch in the tree, he may call for "prune". This will result in no further branches being entered in this tree. This will become a part of the data word, recording the point at which that tree was terminated. The program sequence will then step to the beginning of the next tree.

DEFINE - The observer may call for the display of the definitions of the two choice words representing the currently displayed branch. These definitions will remain added to the display until the choice is made.

4.2 Program Flowchart (See Fig. 2)

4.3 Program Flowchart Definitions

Six Minute Clock - A clock or timer synchronized ± 10 sec. with other clocks used for PCS data, with capability of priority interrupting the CPU (Central Processing Unit) controlling bits operation.

Display -- Cathode ray display, 12 lines x 80 characters, filled by the CPU controlling bits operation at a rate of 9600 BAUD.

Keyboard -- Standard 53 key TTY configured keyboard, programmed to provide CPU interrupt at key operation (i.e. not requiring CR).

Choice Characters -- The arbitrarily chosen characters "Z" and "/".

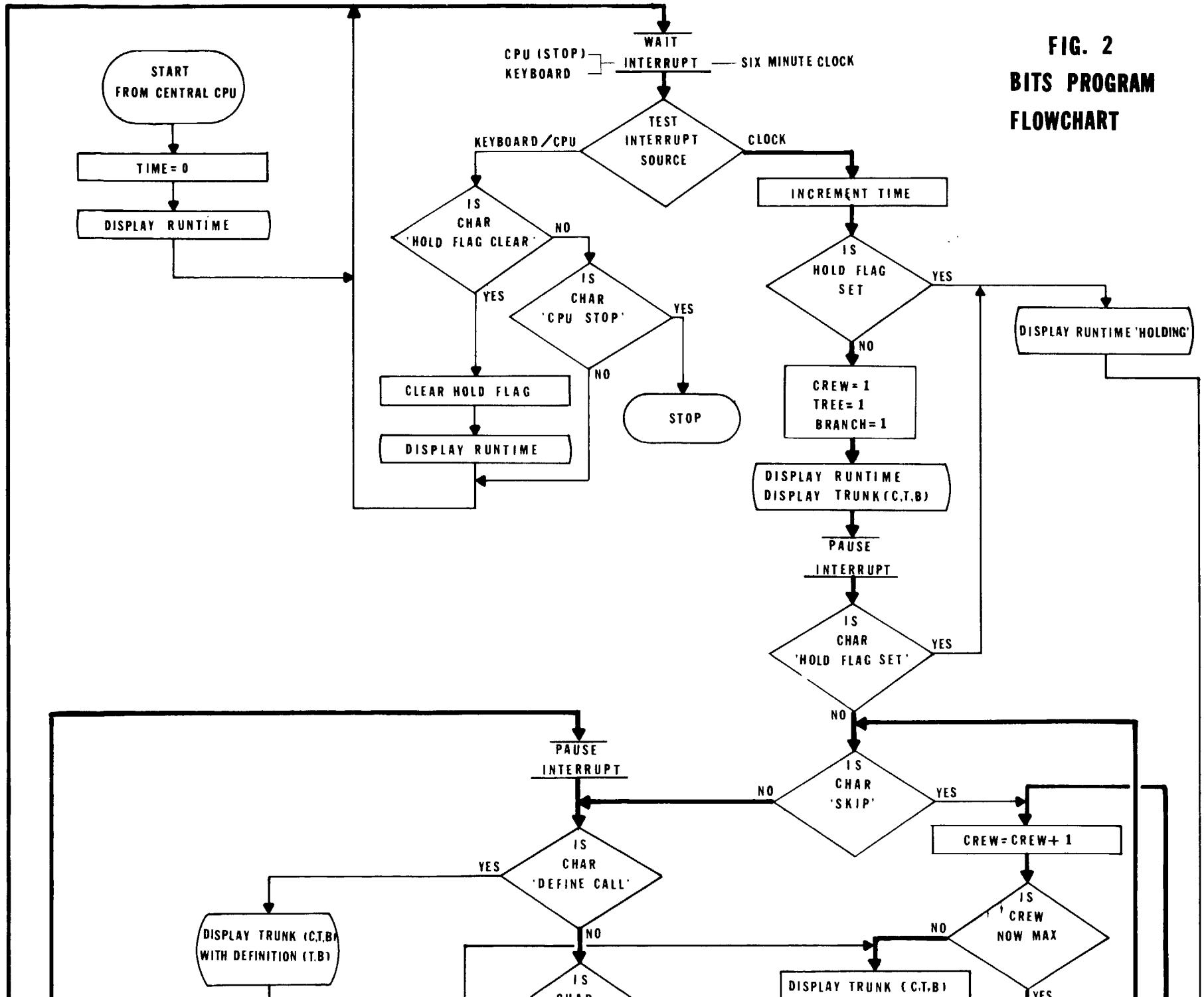
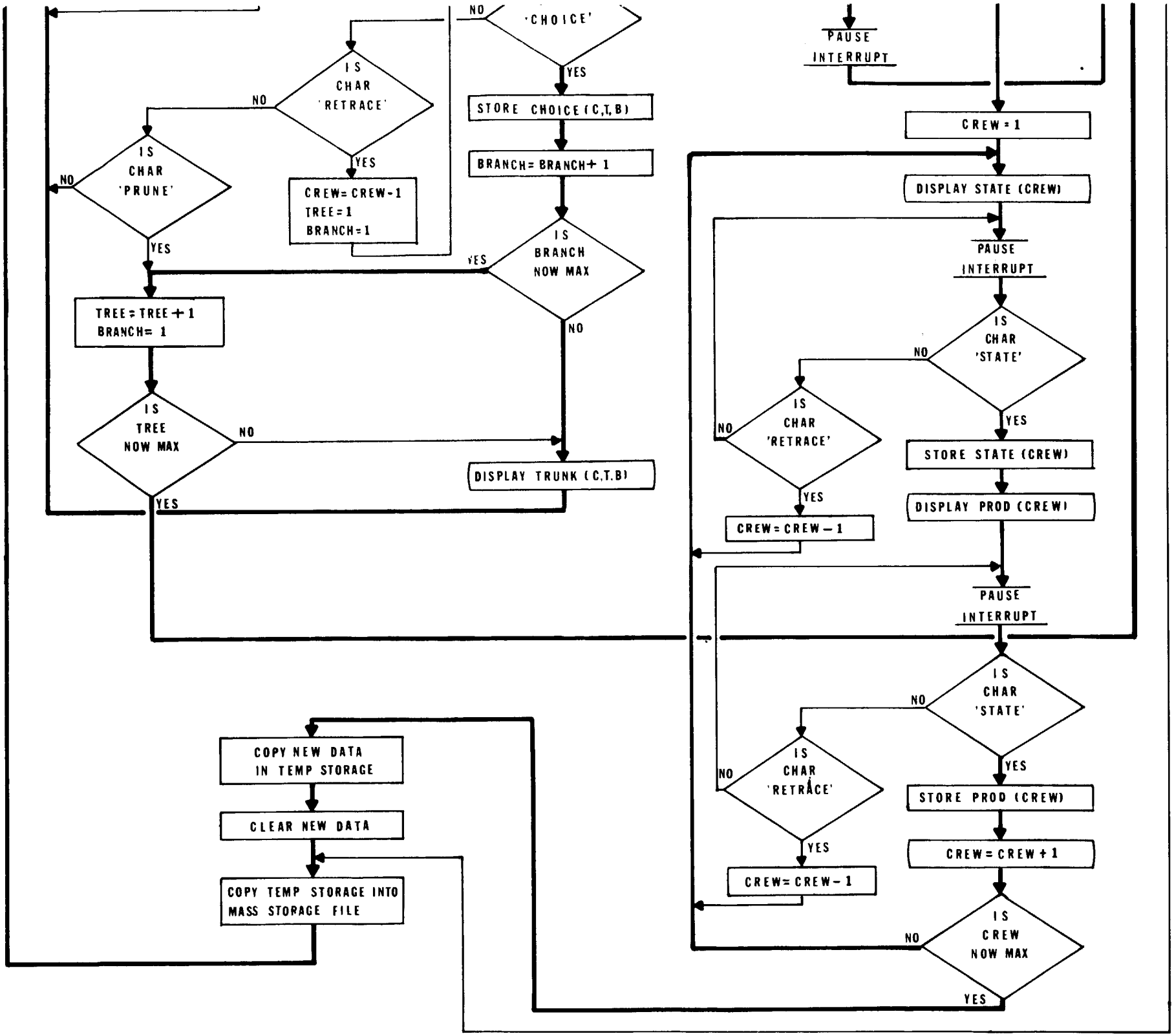


FIG. 2
BITS PROGRAM FLOWCHART


IS CHAR 'CHOICE'
NO
YES
STORE CHOICE (C,T,B)
BRANCH= BRANCH+ 1
IS BRANCH NOW MAX
YES
NO
IS CHAR 'RETRACE'
NO
YES
CREW= CREW-1
TREE=1
BRANCH=1
IS CHAR 'PRUNE'
NO
YES
TREE= TREE+1
BRANCH= 1
IS TREE NOW MAX
NO
YES
DISPLAY TRUNK (C,T,B)
PAUSE INTERRUPT
CREW = 1
DISPLAY STATE (CREW)
PAUSE INTERRUPT
IS CHAR 'STATE'
NO
YES
IS CHAR 'RETRACE'
NO
YES
STORE STATE (CREW)
DISPLAY PROD (CREW)
CREW= CREW – 1
PAUSE INTERRUPT
IS CHAR 'STATE'
NO
YES
IS CHAR 'RETRACE'
NO
YES
STORE PROD (CREW)
CREW= CREW + 1
CREW= CREW – 1
IS CREW NOW MAX
NO
YES
COPY NEW DATA IN TEMP STORAGE
CLEAR NEW DATA
COPY TEMP STORAGE INTO MASS STORAGE FILE

Hold Flag Set Character -- The character "Ø", (Zero).

Hold Flag Clear Character -- The character "C".

Skip Character -- The character "S".

Retrace Character -- The character "R".

Prune Character -- The "space" character.

Define Character -- The character "D".

State Character -- Any number from 1 through 7.

Display Runtime -- Display on top line (a) of CR display the current runtime in hours and tenths (this is the number of 6 minute intervals since the initiation of the program at the beginning of the run. If program calls for timeline "holding" the word "holding" is displayed on the right end of the same line.

Crewman -- In terms of the program sequence, each crewman represents one complete sequence through the selected branches of all the trees unless contingency pathways are chosen. Formally, the program will provide for 6 crewmen, with the actual number of crewmen, and their code names, entered into the program shortly before each run.

Tree (See Fig. 1) -- A tree is formally defined as being a symmetrical binary structure having 8 branch levels and 2^8 endpoints. Formally, the program shall provide for 12 such trees. The actual number of trees to be used, their names, and their contents will be known only shortly before each run, so that provision is

required to fill the formal trees before a run begins. The trees will usually not be filled completely or symmetrically so that a flag procedure is necessary to determine that a sequence of choices has reached the end of the filled branches even though this may not be the formal logic endpoint of the tree.

Branch -- The formal tree will have 255 branches, a branch being a binary choicepoint. Each used branch of a tree will contain two English words or phrases of no more than 18 characters each.

Max Crew -- A test to determine whether the sequence has completed the actual number of crewmen entered into the program before this run began.

Max Tree -- A test to determine whether the sequence has completed the actual number of trees filled for this run.

Max Branch -- A test to determine whether the sequence has reached an endpoint of the filled tree.

Definition -- At the time, before the beginning of a run, that information about crewman and trees is provided, a set of definitions, one for each word in every tree branch, will be provided. Upon entry to the "define" pathway, the definition for each of the two words comprising the current branch will be added to the display until the choice is made, (see Fig. 5).

Trunk -- This term refers to the display of the form shown in Figs. 3, 4, and 5. Fig. 3 shows the display of the first branch of the tree shown in Fig. 1, assuming that the crewman whose activities are being recorded currently has a code name "RED". Fig. 4 shows the display of the second branch of the same tree, assuming that the first branch choice was "NOT READING". Fig. 5 shows the same display with the definitions added.

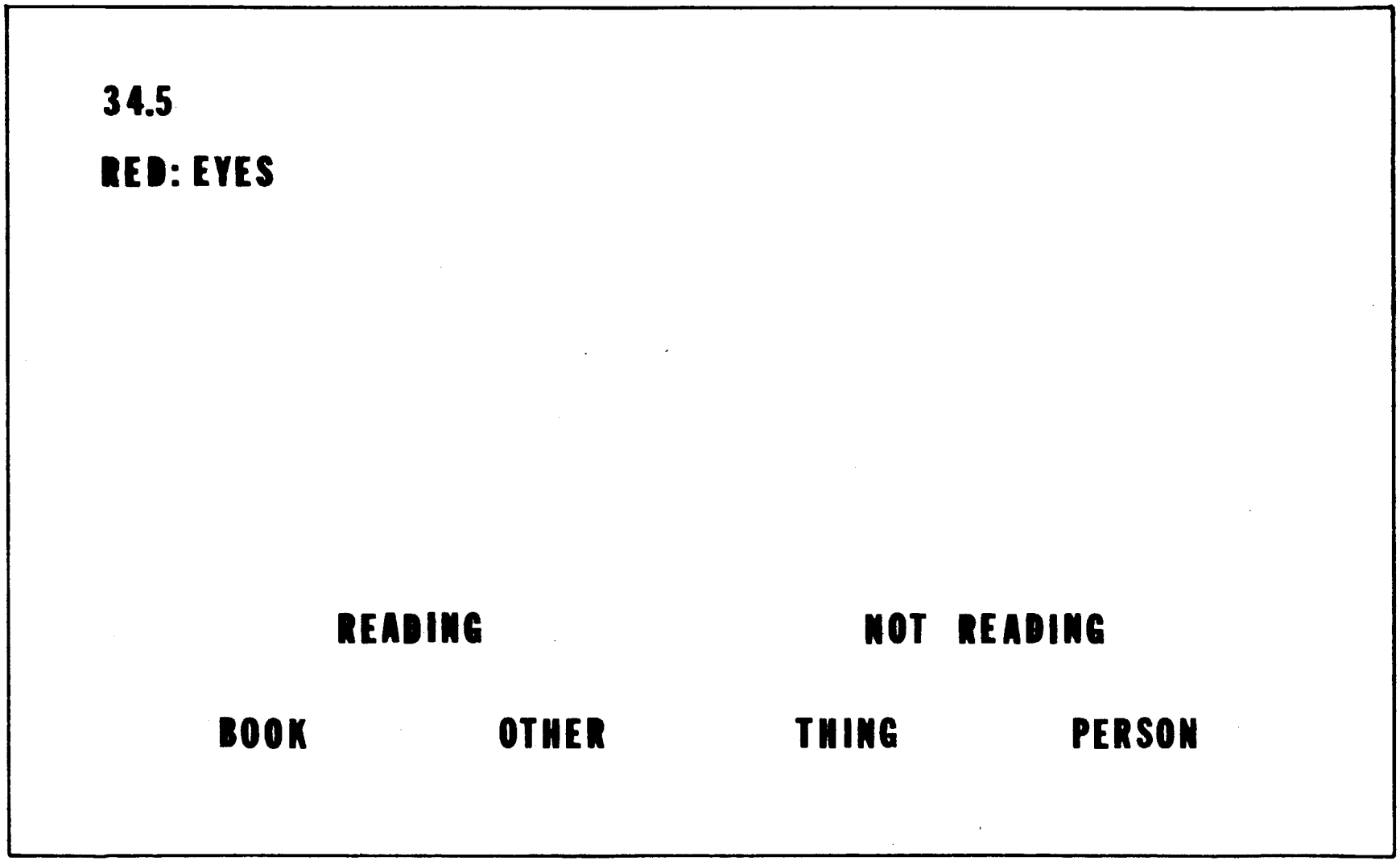


FIG. 3

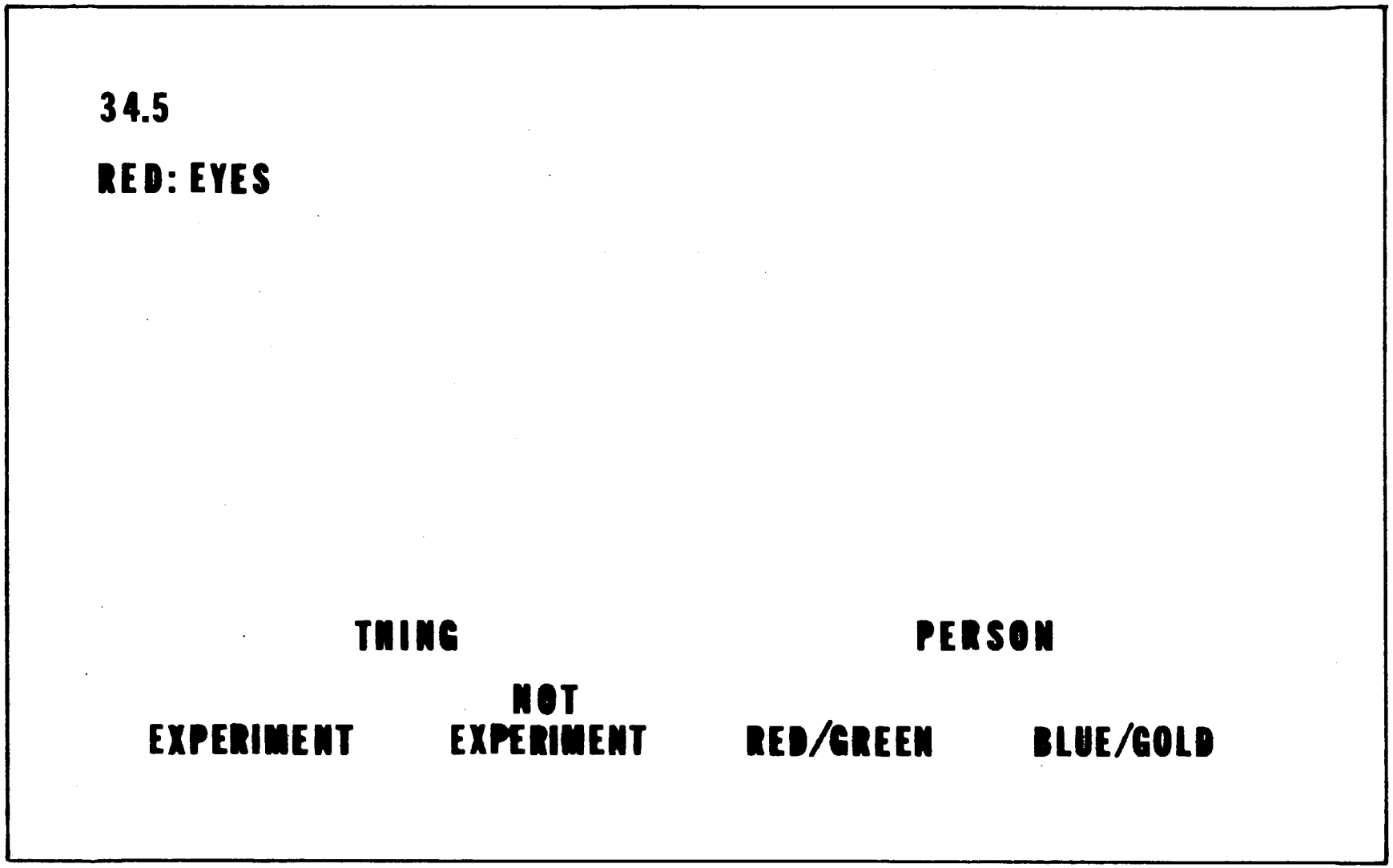

34.5
RED: EYES
THING
PERSON
NOT
EXPERIMENT
EXPERIMENT
RED/GREEN
BLUE/GOLD

FIG. 4

34.5

RED: EYES

THING: ANY VISIBLE PART OF THE ENVIRONMENT EXCEPT A CREWMAN

PERSON: ANY OF THE CREWMEN INCLUDING SELF

THING		PERSON	
EXPERIMENT	NOT EXPERIMENT	RED/GREEN	BLUE/GOLD

FIG. 5

5.0 BITS OBSERVER TRAINING

The training procedure requires that the prospective observers have access to the PCS for approximately one whole day. This is referred to as a "mock run". One week prior to the mock run, each observer is given a copy of the BITS Observer Manual containing updated trees and definitions, a copy of the PCS Operator Manual, and a copy of the preliminary task analysis for the upcoming run. He is required to study these documents thoroughly before the mock run. This run is supervised by the UAH Man/Systems Coordinator, who begins the run with a demonstration of the equipment and procedures, following which he leads the observers on a walk-through examination of the PCS.

Certain of the observers are then assigned to act as crewmen inside the PCS while others actually execute the observing procedure. Observers' roles are rotated every two hours until every observer has served in both roles. This procedure has the advantage of providing the observers with first-hand knowledge of the inside of the PCS as well as the observing procedure. After a final question and answer period, the observers are given their time assignments for the upcoming run.

6.0 UAH BITS OBSERVER MANUAL

6.1 Description and Instructions

The observer follows the events in "inner space" (confinement space) through a closed circuit television and audio system. He "freezes" (simultaneously) the activities of the crewmen at the start of the six-minute sequence and describes the crewmen's activities by making a series of binary choices. These binary choices are arranged in logical sequences so that the sets of choices regarding a particular kind of behavior form a binary logic tree. At the beginning of a tree, that is at the first branch, a choice is made as to which of the two logical halves of an activity type the crewman is engaged in. The choice made at the first branch determines the choices available at the second branch, so that the observer steps progressively toward an endpoint of the tree. Each successive branch thus represents a greater degree of resolution in the description or recording of an activity. Since each tree is a progressive series of choices about one kind of activity, there are a number of trees, all logically identical, but different in content.

The observer's handset contains depressible switches labelled "top" and "bottom" for making the binary decisions, a "punch" switch which shifts the system to the next tree, a "reset" switch which restarts the sequence at the first branch in that tree, a "record" switch which actuates an electronic system to record all of the decisions on paper tape, and an "unusual events" switch which actuates

a tape recorder. Six multi-position switches are present on the handset in a two row, three column matrix. These are the state and productivity setting switches.

At the initiation of a six minute sequence, the first branch of the first tree (see 6.2) is visually displayed on the tree display panel. At this point, the observer depresses the "top" or "bottom" switch on his handset corresponding to his decision. This decision moves the visual display to the next logical branch of that tree and so on until the tree is "decisioned" through. For example, at the start of tree one the choices utility (top) or living (bottom) are visually presented. If the observer depresses "bottom", the next logical binary choice is presented; Room A (top) or Room B (bottom). If the observer chooses "top", the next binary choice presented is table end (top) or door end (bottom). Both of these choices represent endpoints in the tree, a choice of either one completes the tree. At this point, the observer depresses "punch" switch which shifts the system to the next set of choices (tree) and displays the first branch of that tree. The observer continues in this fashion until he has "decisioned" through all of the trees. At the endpoint of last tree, the observer depresses the "punch" switch. Here the punch switch actuates the automatic recycling of the system which represents the same sequence of trees applicable to the next crewmember and displays the first branch of the first tree. The observer continues to make successive decisions until he has described the activities of each crewmember. As the final step in the overall sequence, the observer records, using the numbers 1-7, his estimate of the state and productivity

of each crewman. He does this by setting each crewman's state and productivity switches to his estimate. At this point, the observer depresses the "record" switch and the system is then in wait status until the next observing sequence is initiated by the clock.

Only those trees which contain sets of choices pertinent to the activities of the crewman being observed are "decisioned" through. For example, if a crewman was not engaging in conversation the observer would skip the communication type and content trees for that crewman. The observer does this by depressing the "punch" switch.

A special case in observing occurs when one of the crewmembers goes to the head. In this case, all trees are skipped with the exception of the location and the hands (chores/eating) trees.

When an observer makes an error at a choicepoint within a tree, he depresses the "reset" switch on his handset. This resets to the start of that tree and the first branch is displayed visually. If the observer goes beyond a tree and realizes his mistake, he notifies the operator at the central control console who resets the entire observation sequence (first crewman, first tree).

The "unusual events" recorder is used to record any event in the "inner space" that happens suddenly or unexpectedly. Such an event would be the breakdown of some apparatus in the "inner space" or any unanticipated behavior.

Each observer is witness to many confidential events occurring in the inner space. Some of these events are of a highly personal nature to the crewmembers, others are relative to the project only. The observers are obligated not to discuss any of the

events with outside personnel without consent from higher authority. They must be careful in the kinds of things they say so as not to violate the privacy of any of the crewmembers.

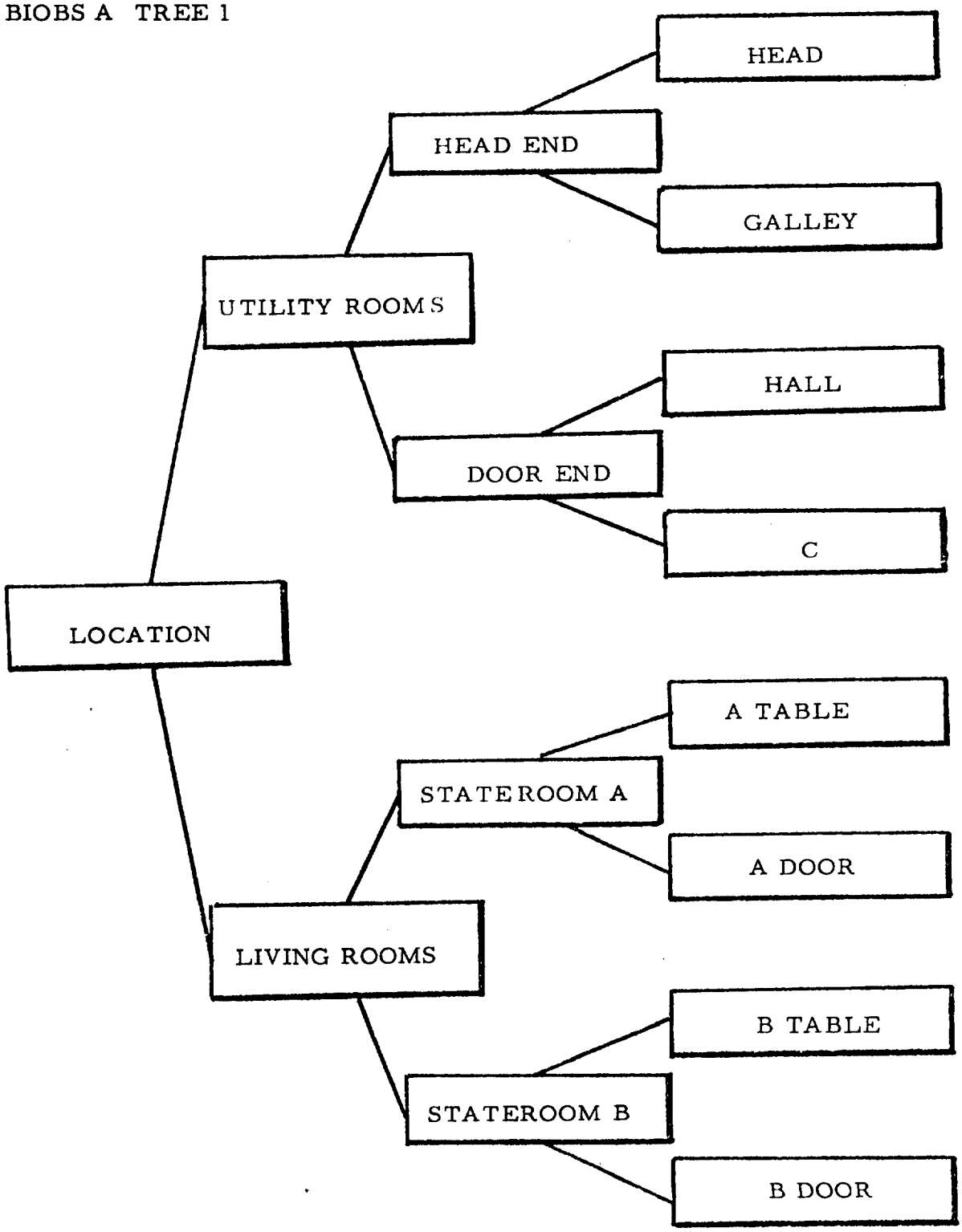
The state and productivity elements of the observing system are neither entirely objective nor capable of formal definition. Your estimate of the state and productivity of the crewmen will probably tend to fluctuate around a rather subjective reference point represented by a setting of 4 on the switches. You will find that several things influence your reference point; these include your own experience in similar situations and/or with similar activities; the overt expressions of the crewmen, including qualitative aspects of their communications with each other; your knowledge of these crewmen themselves; feedback from the actual accomplishments of these crewmen in terms of their work success and progress; feedback from other observers regarding their estimates. You should try to be aware of these influences, not in the sense of trying to avoid them, but in keeping them in perspective. All of these influences should be related to the framework suggested by the following statements.

> STATE - extent of emotional excitement, activity or arousal. A high state represents great emotional involvement, the emotional excitement being positive enough to be obviously displayed. Included in a high state would be such terms as elation, fury, glee, ecstasy, exhilaration, rapacity, while a low state would be characterized by depression, despondency, moping, dreariness, great boredom, glumness.

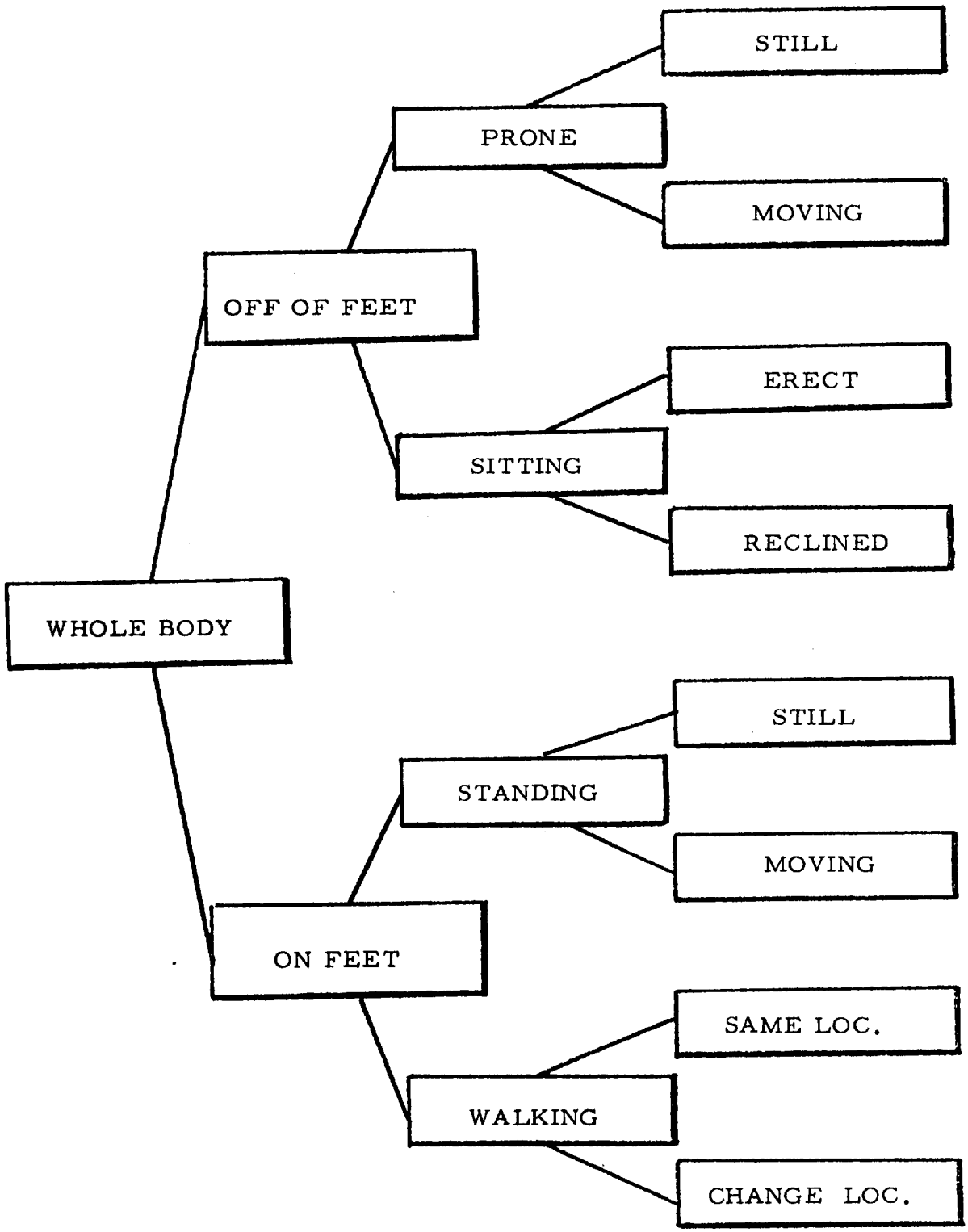
PRODUCTIVITY - the extent of the effectiveness of the person's behavior, the degree of accomplishment. To what extent are the person's present behaviors effective in turning out a product which will benefit him, or in improving his repertoire of effective behaviors by gaining new skills, acquiring new knowledge or understanding, or forming better relationships with others. High productivity would relate to words like accomplishment, efficient, creative, growth. It would represent the wise investment of the resources, energy, and time presently available to that individual. Low productivity would relate to words like waste, failure, ineffectual, fritter. It would represent the squandering of the resources, energy, and time available to that individual in the present circumstances.

In the case of either state or productivity, the scale ranges from 1 (low) to 7 (high), with 4 as the neutral or reference level. The extremes, 1 and 7, represent rarely occurring extremes of deviation, it is expected that those settings will be seldom used.

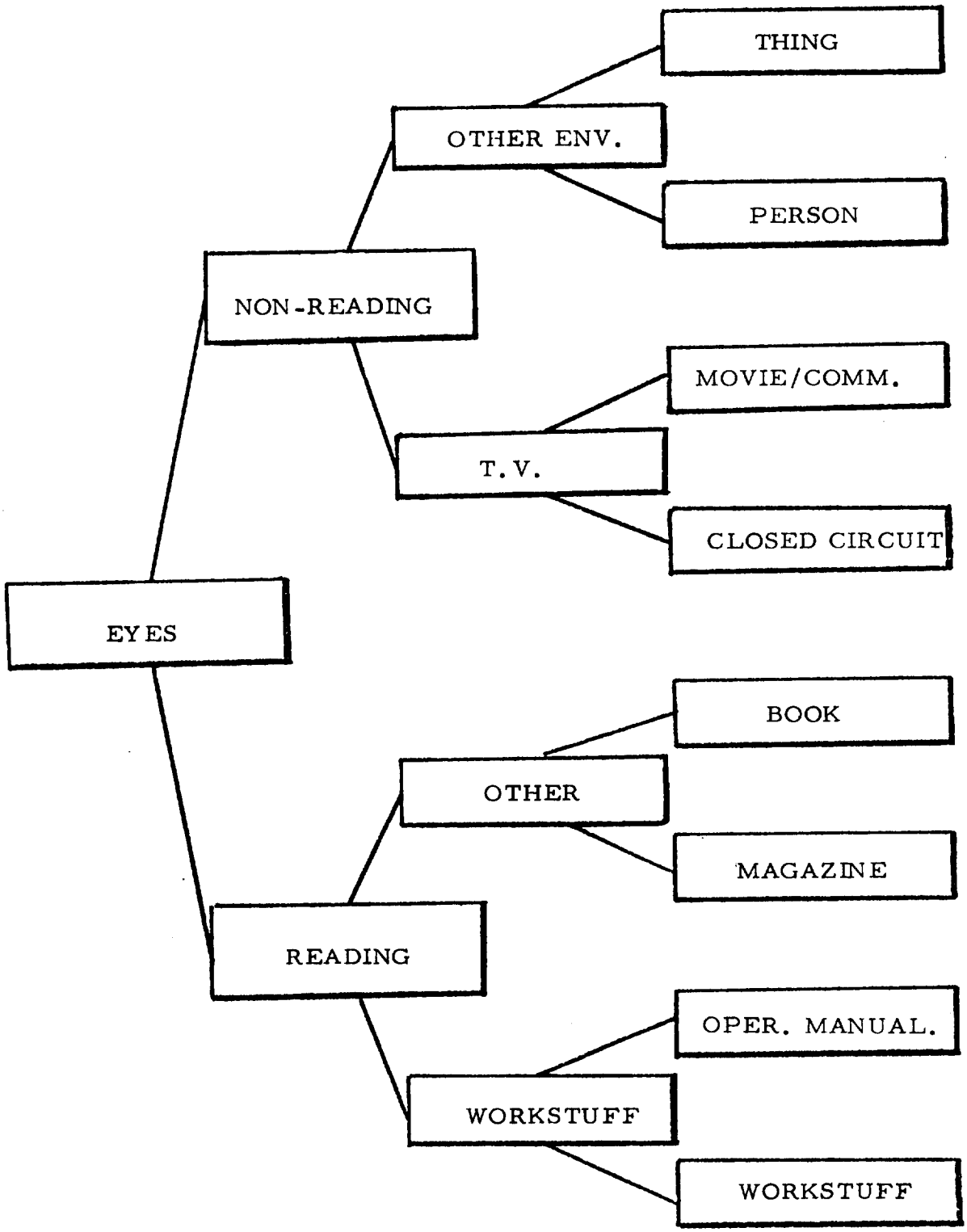
BIOBS A TREE 1



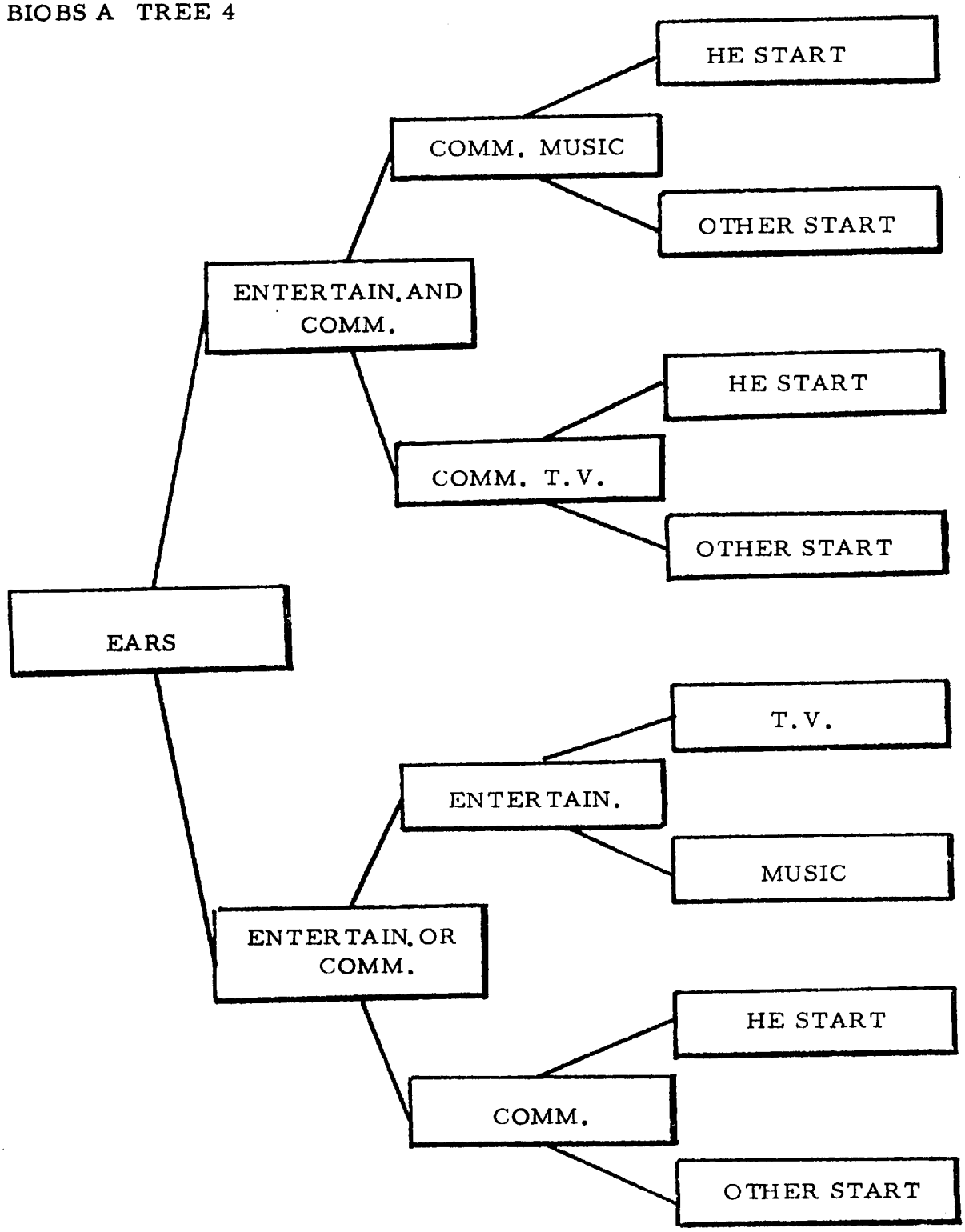
BIOBS A TREE 2



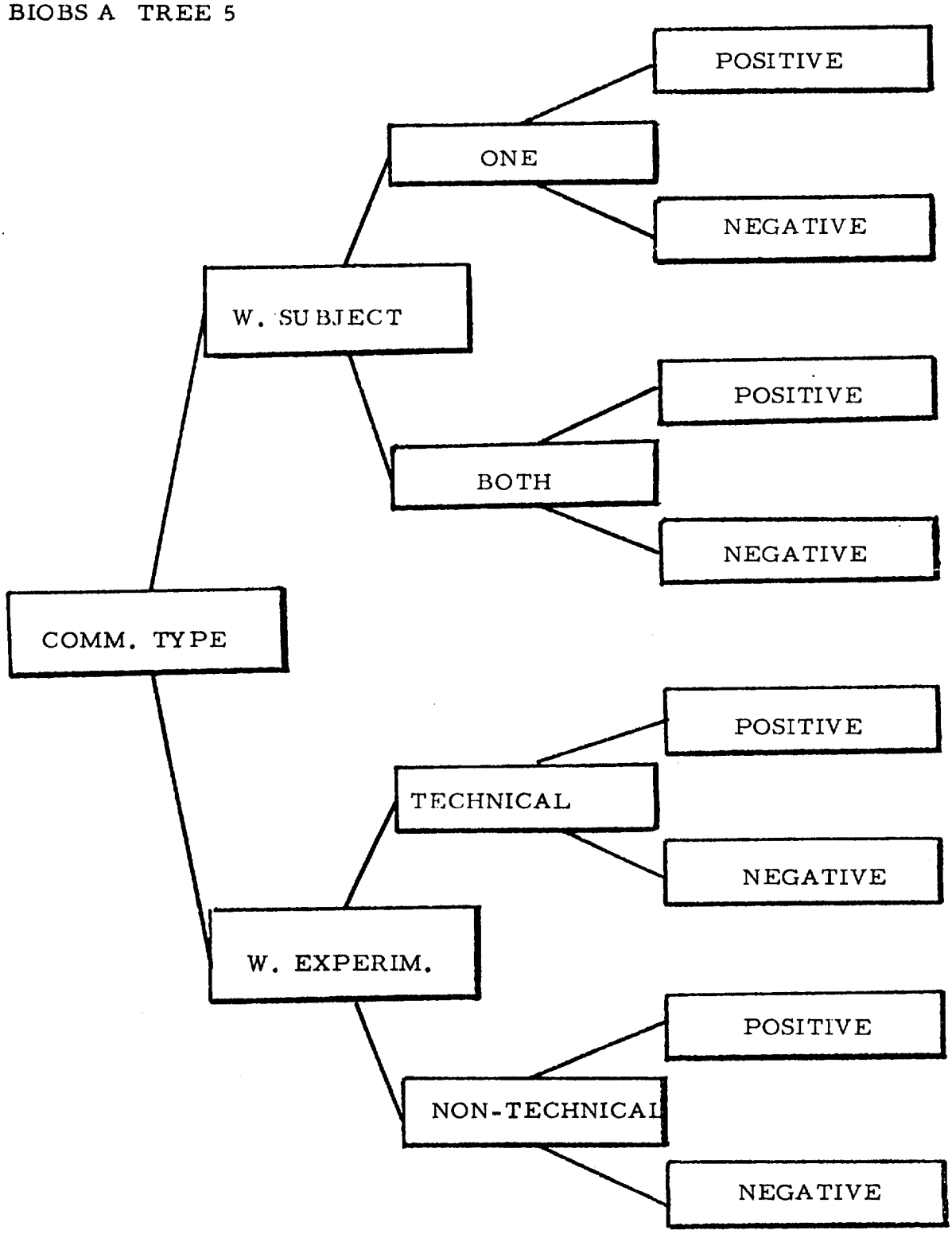
BIOBS A TREE 3



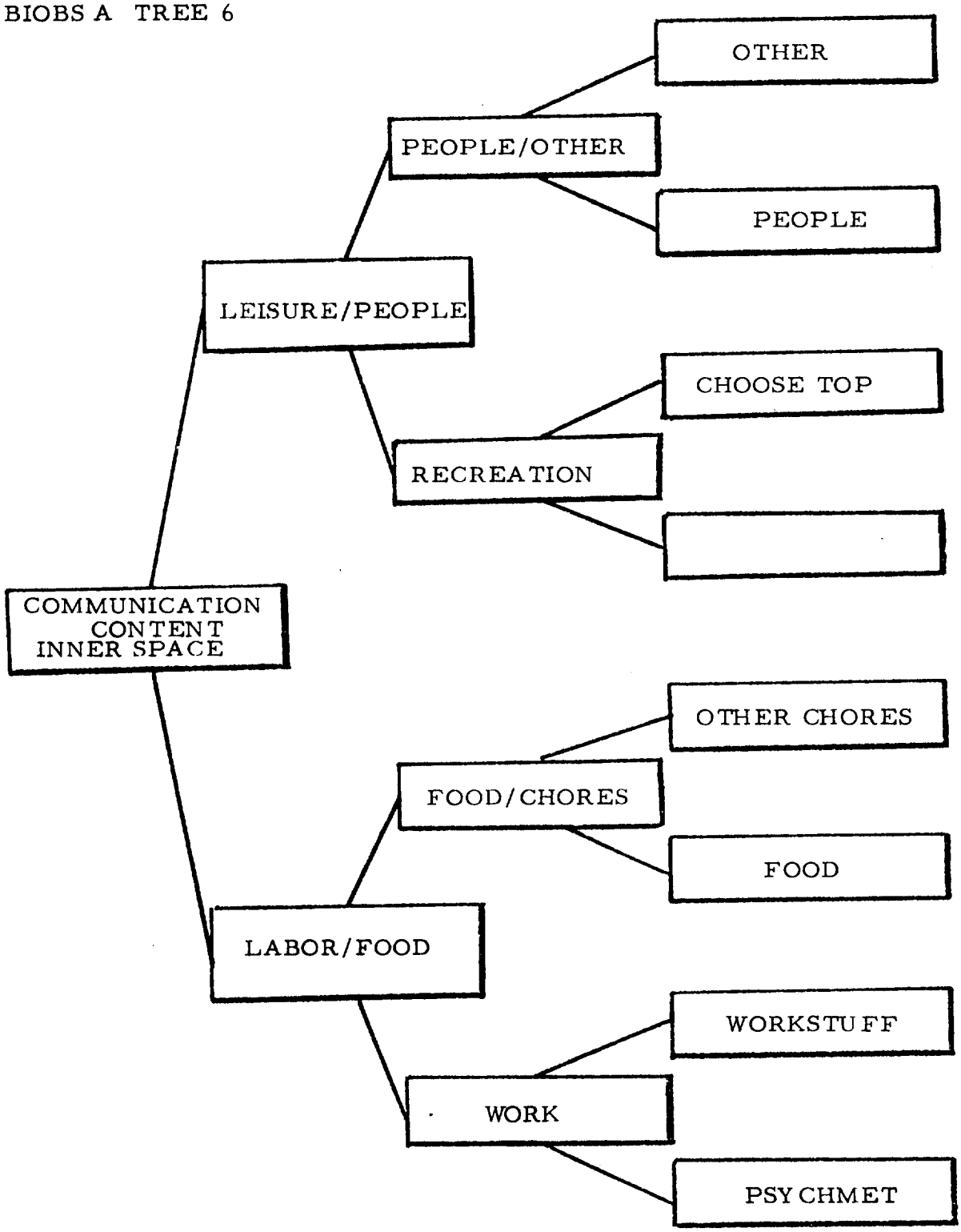
BIOBS A TREE 4



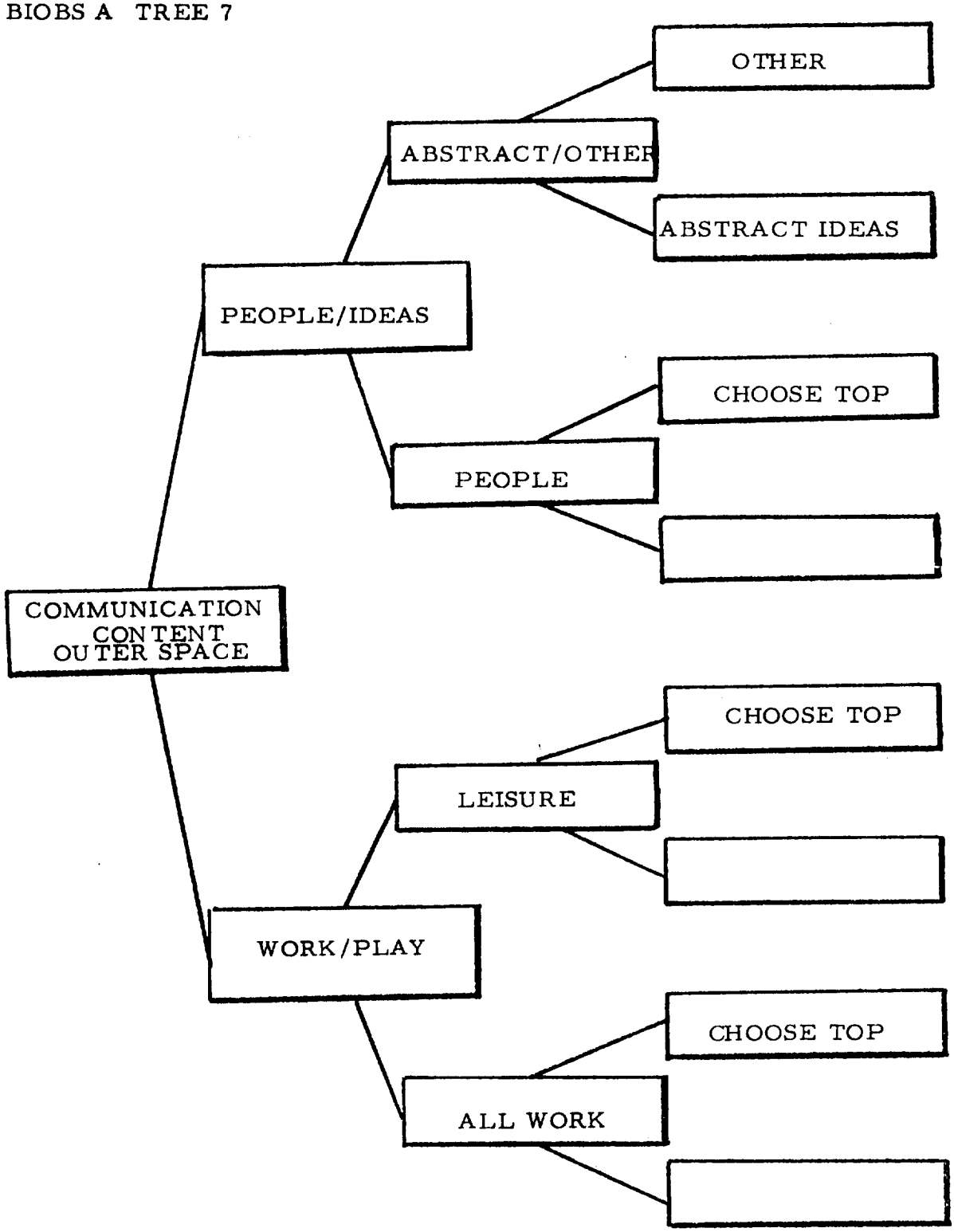
BIOBS A TREE 5



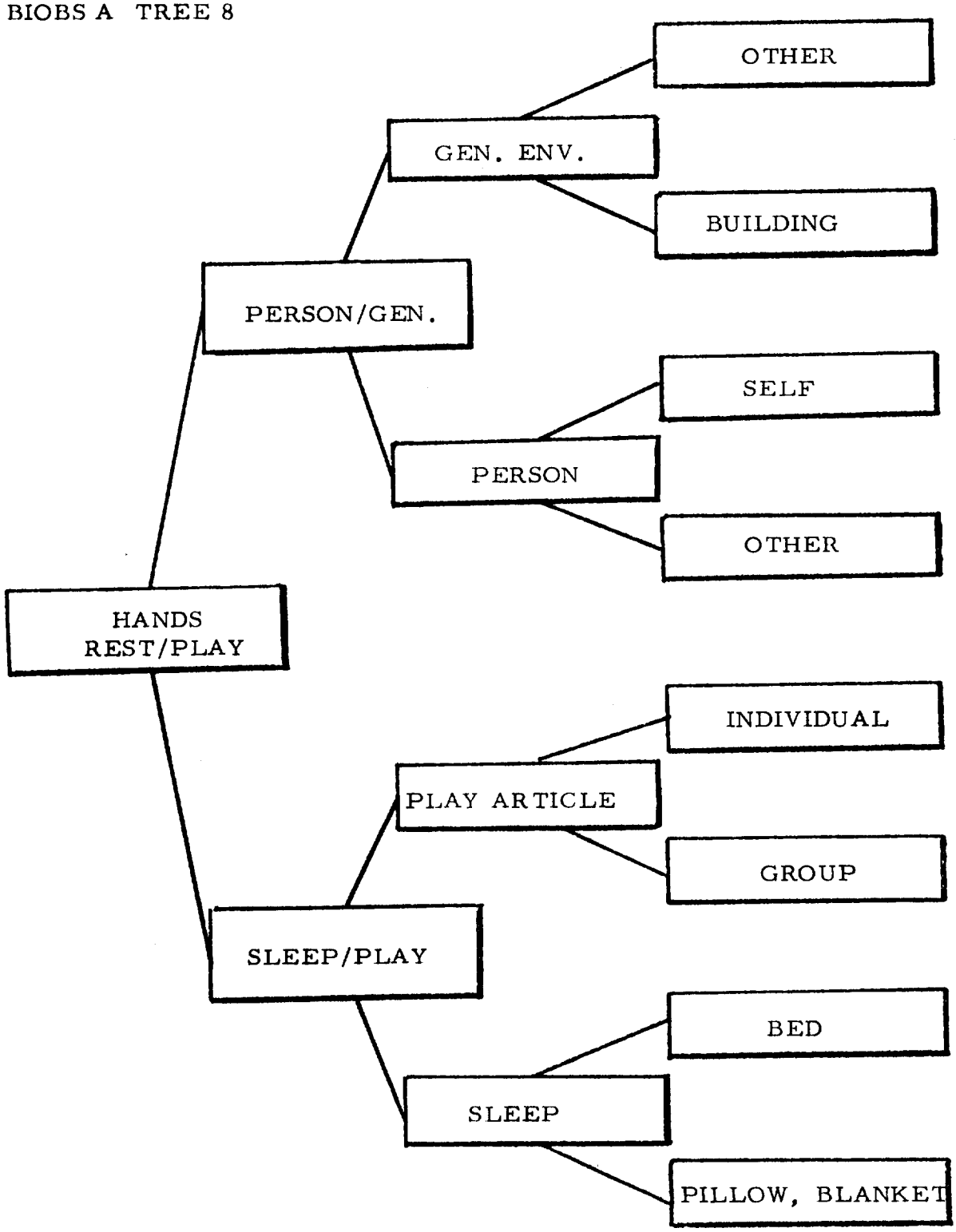
BIOBS A TREE 6



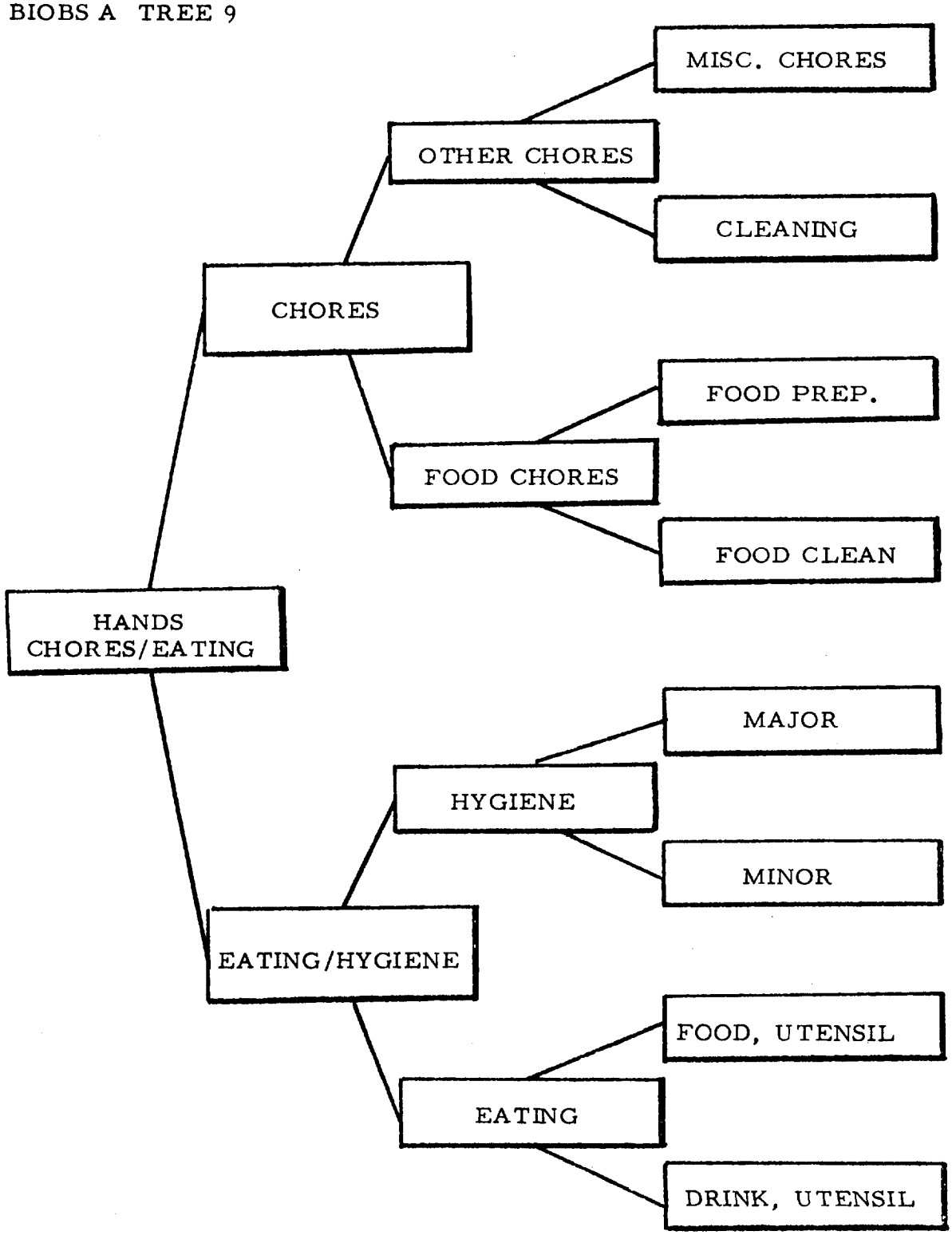
BIOBS A TREE 7



BIOBS A TREE 8



BIOBS A TREE 9



6.3 Definitions of Branches of Trees Currently in Use at UAH

TREE ONE

LOCATION: See figure 6

Utility Rooms: Areas that serve for hygiene, food preparation, and work.

Head End: Area containing the head and galley.

Head: See Figure 6

Galley: See Figure 6

Door End: Area containing the hall or room C.

Hall: See Figure 6

Room C: See Figure 6

Living Rooms: General purpose staterooms.

Stateroom A: See Figure 6

A Table: The half of room A that contains the table.

A Door: The half of room A that contains the door.

Stateroom B: See Figure 6

B Table: The half of room B that contains the table.

B Door: The half of room B that contains the door.

TREE TWO

WHOLE BODY: The Position and Movement of the Body.

Off of Feet: Body weight not on feet.

Prone: Body weight is distributed horizontally on a surface.

Still: No apparent body motion.

Moving: Any part of the body in motion.

Sitting: Angle of spine to floor is between 70^{o} and 140^{o} and body weight on thighs or lower back.

Erect: Acute angle of spine in relation to the floor between 70^{o} and 90^{o}.

Reclined: Angle of spine in relation to the floor between 90^{o} and 140^{o}.

On Feet: Body weight on feet.

Standing: Body weight on feet.

Still: No apparent body motion.

Moving: Any part of the body in motion.

Walking: Change in location preceded by movement of feet.

Same Location: Walking in the same area.

Change Location: Walking across an area border.

TREE THREE

EYES

Non-reading: Eyes oriented toward anything other than reading material.

Other Environment: Any person or thing in the environment excluding the T.V.

Thing: Any non-animate part of the environment excluding the T.V.

Person: One of the other crew members.

T.V.: Anything on T.V.

Movie/Commercial: Video tape movies or commercial T.V.

Closed Circuit: View of the control room.

Reading: Eyes oriented towards reading material.

Other: Eyes oriented toward a book or magazine.

Book: Any book except the program or operator's manual.

Magazine: Any periodical literature.

Workstuff: Eyes on operator's manual or statistics.

Operator's Manual: Explains care, maintenance, and operation of the environment.

Workstuff: The statistics books or texts.

TREE FOUR

EARS

Entertainment and Communication: Conversation while listening to music or watching T.V.

Communication With Music: Conversation while listening to music.

He Start: The crew member being observed initiated the conversation.

Other Start: Other crew member initiated the conversation.

Communication With T.V.: Conversation while watching T.V.

He Start: The crew member being observed initiated the conversation.

Other Start: Other crew member initiated the conversation.

Entertainment or Communication: Either entertainment or conversation is occurring.

Entertainment: Watching T.V. or listening to music.

T.V.: Anything on the T.V.

Music: Music present in crew member's location.

Communication: Vocal exchange, the person participating.

He Start: The crew member being observed initiated the conversation.

Other Start: Other crew member initiated the conversation.

TREE FIVE

COMMUNICATION TYPE: Conversation With Crew Member(s) or Experimenters.

With Subject: Conversation with other crew member(s).

One: Conversation with only one crew member.

Positive: Anything non-negative.

Negative: Complains, verbal avoidance, negative demands or command.

Both: Conversation with more than one crew member.

Positive: Anything non-negative.

Negative: Complains, verbal avoidance, negative demands or command.

With Experimenter: Conversation with the experimenters.

Technical: Conversation pertinent to procedures, equipment, or the program.

Positive: Anything non-negative.

Negative: Complains, verbal avoidance, negative demands or command.

Non-technical: Conversation other than that pertaining to procedures, equipment, or statistics.

Positive: Anything non-negative.

Negative: Complains, verbal avoidance, negative demands or commands.

TREE SIX

COMMUNICATION CONTENT INNER SPACE: Conversation Pertinent To The Crew Area (Activities, Thoughts, Feelings, Etc.)

Leisure/People: Conversation about leisure activities or people within the inner space.

People/Other: Conversation about people or things other than leisure activities in the inner space.

Other: Conversation about things other than people or leisure activities within the inner space.

People: Conversation about crew members.

Recreation: Conversation about leisure activities within the inner space.

Choose Top: Punch top (left) button.

Labor/Food: Conversation about work, food, or other chores within the inner space.

Food/Chores: Conversation about food or other chores within the inner space.

Other Chores: Conversation about maintenance of self or inner space.

Food: Conversation about food within the inner space.

Work: Conversation about workstuff or psychometrics within the inner space.

Workstuff: Conversation about programmed text and materials.

Psychometrics: Conversation about the TASK and HUG & PI forms.

TREE SEVEN

COMMUNICATION CONTENT OUTER SPACE: Conversation Pertinent To The Real World (Activities, Thoughts, Feelings, Etc.)

People/Ideas: Conversation about people or ideas in the real world.

Abstract/Other: Conversation about abstract or concrete ideas in the real world.

Other: Concrete ideas associated with a specific instance in the real world.

Abstract Ideas: Theoretical, disassociated from any specific instance in the real world.

People: Conversation about people in the real world.

Choose Top: Punch top (left) button.

Work/Play: Conversation about leisure or work in the real world.

Leisure: Conversation about leisure activities in the real world.

Choose Top: Punch top (left) button.

All Work: Conversation about any work in the real world.

Choose Top: Punch top (left) button.

TREE EIGHT

HANDS REST/PLAY: Hands In Rest Or Play Situations.

Person/General: Hands on person or general environment.

General Environment: Hands on the building or other parts of the environment.

Other: Hands on moveable parts of the environment (tables, chairs, ashtrays, etc.).

Building: Hands on stationary parts of the environment (walls, doors, etc.).

Person: Hands on self or other person.

Self: Hands on self.

Other: Hands on other crew member.

Sleep/Play: Hands on sleep or play materials.

Play Article: Hands on play article.

Individual: Hands on play article that can be used by an individual.

Group: Hands on play article that can be used by a group.

Sleep: Hands on bed, pillow, etc.

Bed: Hands on bed.

Pillow, Blanket: Hands on pillow or blanket.

TREE NINE

HANDS CHORES/EATING: Hands On Maintenance Aids Or Food.

Chores: Hands on food or maintenance materials.

Other Chores: Hands on miscellaneous materials and cleaning materials.

Miscellaneous Chores: Any maintenance chores other than cleaning (such as putting in a light bulb).

Cleaning: Any cleaning chores (vacuuming, dusting, etc.)

Food Chores: Food preparation and cleanup.

Food Preparation: Any chores related to preparing food.

Food Cleanup: Cleaning the food area and utensils.

Eating/Hygiene: Hands on hygiene or food materials.

Hygiene: Hands on major or minor hygiene materials.

Major: Hands on materials involved in washing and dressing such as towels and clothes.

Minor: Hands on item such as toothbrush, comb, kleenex.

Eating: Hands on food or drink utensils.

Food, Utensil: Hands on plate, fork, knife, etc.

Drink, Utensil: Hands on cup, glass, etc.

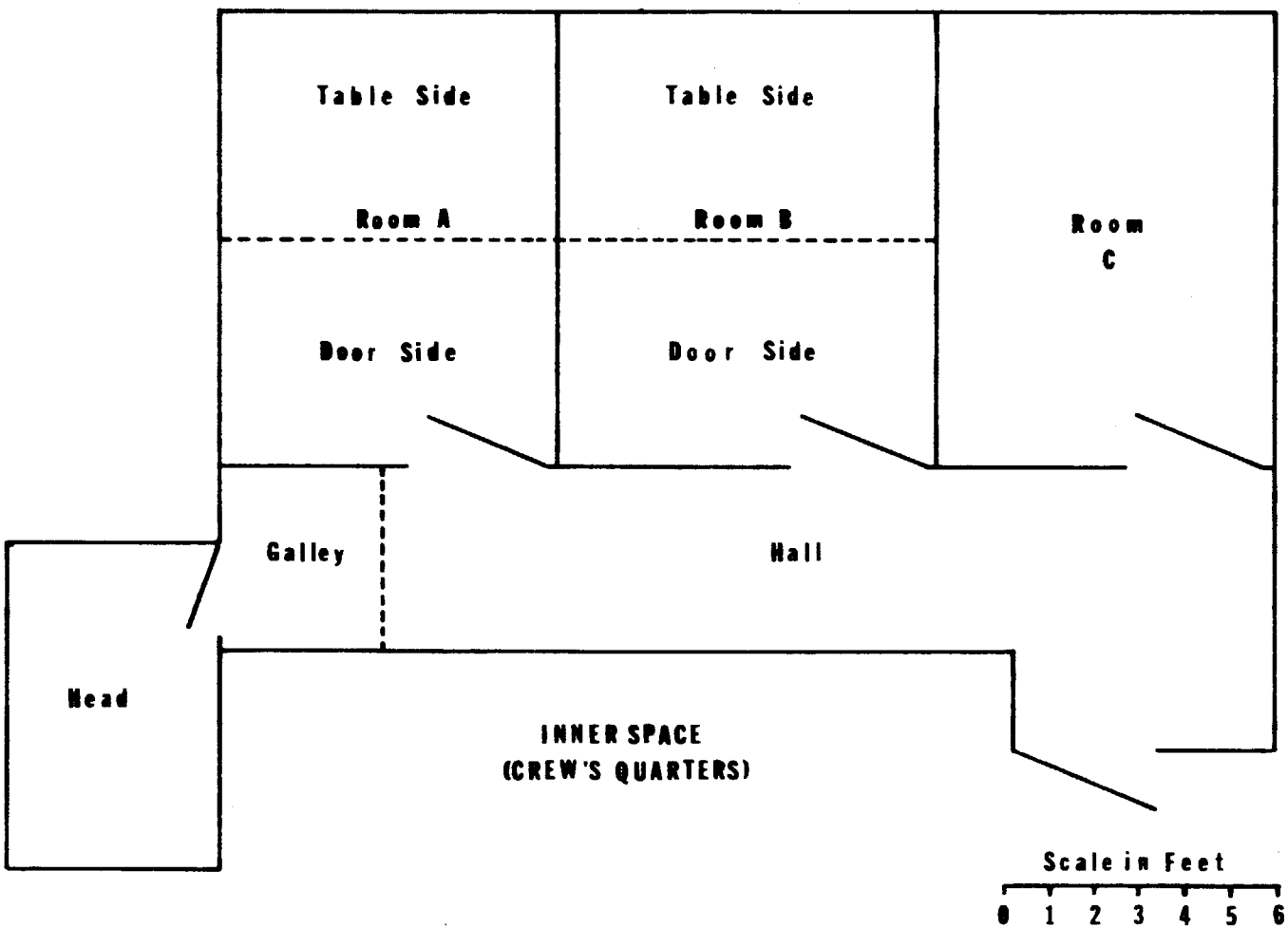


Table Side
Table Side
Room A
Room B
Room C
Door Side
Door Side
Galley
Hall
Head
INNER SPACE
(CREW'S QUARTERS)
Scale in Feet
0 1 2 3 4 5 6

FIG. 6

PHASE B

VOL II B

INSTRUMENTS FOR PROVISION OF DATA BY CREWMEN

PHASE B/VOL II B
INSTRUMENTS FOR PROVISION OF DATA BY CREWMEN

1.0 RATIONALE FOR USE OF PSYCHOMETRIC INSTRUMENTS

The efforts of Man/Systems planners are directed toward the design of complex man/machine systems in which the interaction between the man and machine facilitates rather than detracts from the goals and work of the man. In making decisions toward this goal, the Man/System planner may assume that in many respects all of the human users of the system are alike. Many decisions are not affected by who the user will be, much of the feedback received from the user is independent of who the user is.

The Man/Systems planner is also acutely aware, however, that all people are not alike, that users of the systems are individuals who obviously differ in many important respects from each other. In many of his planning decisions these individual differences cannot be ignored without causing deficiencies in Man/Systems interface and procedures. In the same sense, some aspects of the feedback received from individual users are influenced by their individually unique characteristics, and must be interpreted accordingly if wise decisions are to be made about alteration of systems and procedures. It is therefore one of the central and critical tasks of the Man/Systems planner to identify, however tentatively, some of the most relevant dimensions of the individual differences among the users of the system. As an unavoidable next step, he must, however crudely, attempt to measure these dimensions in order to take them into account systematically in his decision making. Fortunately, this process is not in as

crude a state as might be imagined. Rather elegant mathematical procedures have contributed substantially to the development of several scales or measures whose reliability and validity have been demonstrated to be far above chance, and substantially better than educated guesses derived from informal observations or from "common sense."

It is for the reasons stated above that some of these scales, or others based on them, are used in these simulation runs. These measures are not included to gather information about the crewmen for the purpose of studying the crewmen, per se, but as a means of identifying variables which can be used to assist in the accurate interpretation of the primary data gathered during these simulations.

Questionnaires leading to the kinds of scales just discussed fall into two major classes. The first class consists of questionnaires built from a set of questions whose meaning is straightforward and obviously related to the scales or measures to be derived from them. These questions are said to have "face validity" in that their purpose is obvious, and the process of interpreting a person's answers to them is straightforward. The second class of questionnaires is more abstract and subtle. In this case, the questionnaire comprises a subset of questions selected from a very large original set of almost randomly drawn questions. The selection of the subset is accomplished by the empirical determination of those questions answered differently by sets of people having common differences. Each selected question is then weighted according to its contribution to each one of several variables, or scales, which can be discriminated by the subset

of questions. Thus, the information obtained about an individual is interpreted solely in terms of his relative position on these scales. This information is useful to the Man/Systems planner since it provides for identification and measurement of relevant dimensions of uniqueness among individuals.

In the specific case of the questionnaires selected for these simulation runs, many of the questions may seem irrelevant, needlessly personal, or difficult to answer. It is true that these questions have little face validity, but it is also the case that the answers to such questions are never examined individually. There is no interest in the way a specific question, as such, is answered. The information used is the relationship between the ranking of crewmen on certain abstract scales and their activities in, and evaluation of, the PCS.

2.0 DATA PRODUCED BY PSYCHOMETRIC INSTRUMENTS

In the case of all the instruments used in the Man/Systems experiments associated with PCS runs, the answers to all questionnaires are transferred directly to punch cards by keypunch operators. From this point on they are identified only by a code name identifying the particular run, and a number corresponding to crewmen within that run. The crewman's actual identity can be associated with these records only by the PCS Test Director. These data are then entered into a computer data bank in the form of numeric arrays. From these arrays the various scales may be derived. The following are examples of typical kinds of analysis these data will be submitted to: What is the extent of the relationship between values on psychometric scale X and the feedback regarding the adequacy of storage space in the PCS? What is the extent of the relationship between the adequacy of the crewman's experiment space and his reported productivity? Another kind of use of these data is as a context for the interpretation of other data, for example the adjustment of the total number of positive rankings on the GPL Effectiveness Rating Scale by a factor derived from the relatively weighted scales M, T, and X of questionnaire "B".

3.0 THE INSTRUMENTS

3.1 The GPL Effectiveness Rating Scale

3.1.1 Use of GPL Effectiveness Rating Scale

The GPL Effectiveness Rating Scale is designed for use in both open system and closed system simultation runs. It should be filled out one time during each run by each crewmember, preferably near the end of the run but while the crewman is still onboard. It should also be filled out by each observer, near the end of the run. A copy of the form and its instructions should be posted in the observation room during the run.

The meaning of the information provided on this form is straightforward. Visual inspection of the completed forms will reveal apparent relative strengths and weaknesses among characteristics of the GPL. The forms should be visually inspected prior to the debriefing to insure that apparent relative variations are explored during the debriefing. Data should then be keypunched and entered into the data bank. From this point, descriptive statistics (mean rankings and deviations, differences between observers and crewmen) may be obtained. As the data is cumulated over several runs and for a number of crewmen, consistently reported anomalies may be noted for attention, particularly if these anomalies are also identified by the data from several other instruments.

INSTRUCTIONS FOR
THE GPL EFFECTIVENESS RATING SCALE

The GPL EFFECTIVENESS RATING SCALE is one of several ways you can provide feedback toward the enhancement of the GPL Man/Systems interface. The particular kind of information it provides has been found to be very useful when combined with other forms of feedback you will provide. It is of considerable importance that you keep in mind that you will have opportunities to comment upon specific details in the debriefing so that such comments are not necessary on this form.

This form provides for rating the effectiveness of the GPL in supporting certain activities and functions. You are asked first to provide an overall rating for each of the seven categories across the top of the form. In the first four categories, your consideration is directed toward how well the GPL supported certain activities. In the last three, you should rate the overall effectiveness of three aspects of the GPL itself. The rating for each category is provided by circling one of the five letters E V F W P where:

E = Excellent
V = Very Good
F = Fair
W = Weak
P = Poor

After providing a general rating for each category, you should consider the relationship between that category and each of ten different characteristics of the GPL, as they appear vertically on the form. To what extent did each of these characteristics of the GPL facilities affect the activity or function? If the effect was noticeably positive, circle the corresponding +. If its effect was noticeably negative, circle the -. If the effect was trivial, unknown, or irrelevant, circle neither sign.

Finally, please provide your name, the name of your experiment, and the date, and in so doing, recognize the appreciation of the Man/Systems team for your considered feedback.

GPL EFFECTIVENESS RATING SCALE

CHARACTERISTICS OF SPACE OR EQUIPMENT	ACTIVITIES				GPL		
	EXECUTION OF EXPERIMENT	DATA ACQUISITION AND RECORDING	DATA ANALYSIS AND EXAMINATION	EXPERIMENT MAINTENANCE	YOUR EXPERIMENT AREA	GENERAL SUPPORT FACILITIES	GPL AS A WHOLE
	E V F W P	E V F W P	E V F W P	E V F W P	E V F W P	E V F W P	E V F W P
AMOUNT	+ −	+ −	+ −	+ −	+ −	+ −	+ −
LOCATION	+ −	+ −	+ −	+ −	+ −	+ −	+ −
ARRANGEMENT	+ −	+ −	+ −	+ −	+ −	+ −	+ −
RELIABILITY	+ −	+ −	+ −	+ −	+ −	+ −	+ −
LIGHTING/ VISIBILITY	+ −	+ −	+ −	+ −	+ −	+ −	+ −
SAFETY	+ −	+ −	+ −	+ −	+ −	+ −	+ −
COMFORT OF USE	+ −	+ −	+ −	+ −	+ −	+ −	+ −
FREEDOM FROM DISTRACTION	+ −	+ −	+ −	+ −	+ −	+ −	+ −
FLEXIBILITY OF USE	+ −	+ −	+ −	+ −	+ −	+ −	+ −
AVAILABILITY AS NEEDED	+ −	+ −	+ −	+ −	+ −	+ −	+ −

NAME _____ EXPERIMENT _____ DATE _____

3.2 The Habitat User's Goals and Perceived Instrumentalities

3.2.1 Use of the Habitat User's Goals and Perceived Instrumentalities

The HUG & PI should be filled out once near the end of each run, by each crew member. Its use is more appropriate to closed system runs; it is not suggested for use in the open system series. It requires approximately thirty minutes to complete.

Before the debriefing, the forms should be inspected for large discrepancies between the "importance" and "supportiveness" ratings of each of the goals. This information should be used to be sure that the areas touched on by such discrepancies are covered in the debriefing.

After the run, the information is punched into cards and transferred to the data bank. Analysis including this information will be concerned with the relationships among patterns of importance of goals and various psychometric scales, the relationship between stated goals and the time spent in activities related to those goals, the relationship between the extent to which the crewman's important goals were supported and his productivity.

INSTRUCTIONS FOR THE
HABITAT USER'S GOALS AND PERCEIVED INSTRUMENTALITIES
RATING SCALE

This questionnaire provides the Man/System research team with information about relationships between the characteristics of the PCS and a subset of your individual goals. The subset of goals or objectives considered is not inclusive, particularly in that it gives almost no attention to your scientific or professional goals. This is deliberate since these goals are the primary concern of almost all of the Man/Systems data collected during these PCS experiments. This questionnaire is thus designed to provide some balance and additional perspective to the total data bank. You are, therefore, asked to consider each of the goals listed as independently as possible. Whether this subset of goals and objectives is more or less important to you than your scientific and professional goals is not relevant to this one questionnaire. The relative importance among this particular subset of goals or objectives is the question relevant here.

You are asked to begin your work on this questionnaire by reading through the entire list of goals before rating any of them. Following this initial reading you should rate each one of these goals or objectives in terms of its importance to you as it relates to your life in this habitat. This rating is accomplished by circling the most appropriate number in the left array, where:

7 = of overriding importance
6 = of vital importance
5 = of quite considerable importance
4 = of clear importance
3 = of some importance
2 = of minor importance
1 = not at all important

After rating the importance of all of the goals, consider the extent to which this habitat supports you, either directly or indirectly, in the achievement of each of these goals or objectives. This rating is accomplished by circling the most appropriate number in the right array of numbers, where:

7 = extremely supportive of the goal
6 = highly supportive
5 = definitely supportive
4 = adequately supportive
3 = somewhat supportive
2 = a bit supportive
1 = not at all supportive

HABITAT USER'S GOALS & PERCEIVED INSTRUMENTALITIES

Goals or objectives	Importance to you as a goal while living in the habitat	Degree to which the habitat is supportive of the goal
Getting my job done	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Getting routine habitat maintenance done	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Getting along with other people who live in the habitat	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Being able to adapt to unexpected or unusual circumstances	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Maintaining a sense of personal stability	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Exposure to variety	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Feeling whole and complete as a person	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Finding some privacy	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Keeping in contact with the world in general	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Having a good time	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Feeling comfortable	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Eating well	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Relaxing	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Keeping in contact with close friends and family outside the habitat	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Sleeping well	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Getting in good psychological shape for my work	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Keeping up my morale	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Keeping myself in good physical shape	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Keeping healthy	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Developing myself as a person	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Contributing to overall success of the mission	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Helping other crew members in their work	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Increasing work capability and technical competence of those in the habitat	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Increasing one's capability to earn more money	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Learning what it would be like to be in an isolated habitat	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Developing design insights for living and working in isolated habitats	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Doing something unique or novel	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Having something to talk about after the mission is over	1 2 3 4 5 6 7	1 2 3 4 5 6 7

3.3 Time Allocation Sample Key (TASK)

3.3.1 Use of the Time Allocation Sample Key (TASK)

The TASK, which requires approximately twelve minutes to complete, should be filled out by each crewman each day fourteen days before the run, during the run and fourteen days after the run. The optimal time of day for filling out the TASK is shortly before retiring. Crewmen may need to be prompted to fill out the key during the run. The TASK information is meaningful only for closed system runs.

Visual inspection of the TASK forms near the end of the run may reveal that there has been a marked shift in the crewman's state, productivity or activities during the course of the run, or during the run as compared with the more normal period before the run. Such marked changes should be discussed during debriefing. Also noted during visual inspection would be any dramatic changes that occur during the run. During the debriefing, an attempt should be made to ascertain the circumstances surrounding such abrupt changes.

After the run, the data from TASK are placed into the data bank via punched cards. The types of analysis used would relate this productivity measure to other productivity information (ADA, BITS, etc.) to derive a productivity value for that individual, or would relate changes in state and productivity to events during the run or to use of various PCS systems, or would relate recovery from a depression in state or productivity to changes in activity, or would relate the maintenance of high productivity to various psychometric measures.

INSTRUCTIONS FOR THE TASK (TIME ALLOCATION SAMPLE KEY)

The function of this form is to provide information about the kinds of activities you are engaged in during each day, and how your state and productivity vary throughout the day. This information will be used to examine the nature of the changes that occur as a function of your transition between your usual situation and the present situation, and to detect the effects of various events within this situation. Your candid and thoughtful reporting on this form are a vital part of the total Man/Systems data bank.

WHEN TO FILL OUT THE FORM

This form should be filled out at the end of each day, preferably shortly before retiring. The following order should be used in filling out the form:

1. Activities Chart
2. State Graph
3. Productivity Graph

HOW TO FILL OUT THE ACTIVITY CHART

The chart should summarize the times you were actually engaged in various activities. For each activity listed, simply mark in the time you were actually engaged in it. Don't bother to indicate very small amounts of time, if your total participation in an activity consumed much less than an hour at any one time, simply omit it. If you find that you were engaged in more than one of these activities simultaneously, mark both (or all) of them. The categories are rather broad, and although cursory definitions are provided on the next page, you will encounter ambiguity. In such cases, use your own judgment. Since the analysis of this information concerns change, it is more important that your usage of categories is consistent than that you use them the same way that anyone else does.

HOW TO DRAW THE STATE GRAPH

Essentially, this is a picture of your "psychological state" during the waking hours of the day. This is obviously a purely subjective process. It cannot be assumed that "psychological or emotional state" means the same thing to you that it does to anyone else. Since the analysis concerns change, your information has meaning to the extent that your own definition is consistent. As a reference point, a high state, indicated by "7" on the scale, reflects great emotional activity or arousal, being "up" or elated or excited. A very low state, indicated by "1" suggests depression, or being "down", extremely bored. The extremes, "1" and "7" should represent your own rare extremes, as low or high as you normally ever get. The midpoint, "4" suggests a neutral or reference level.

HOW TO DRAW THE PRODUCTIVITY GRAPH

Productivity is also a subjective term, and the same consideration regarding the consistency of your own interpretation applies. The following statement provides a general reference. Productivity indicates the effectiveness of one's behavior, the degree of accomplishment. It reflects the extent to which one's present behaviors are effective in turning out a product which will benefit him or others, or in improving his repertoire of effective behaviors by gaining new skills, acquiring new knowledge or understanding, or forming better relationships with others. High productivity, ("7") would represent wise investment of the resources, energy or time available to the individual in the present situation. Low productivity would represent the waste or useless depletion of the same resources, energy, or time. As in the state graph, the extreme levels ("1" and "7") represent the extreme variations in your own experience.

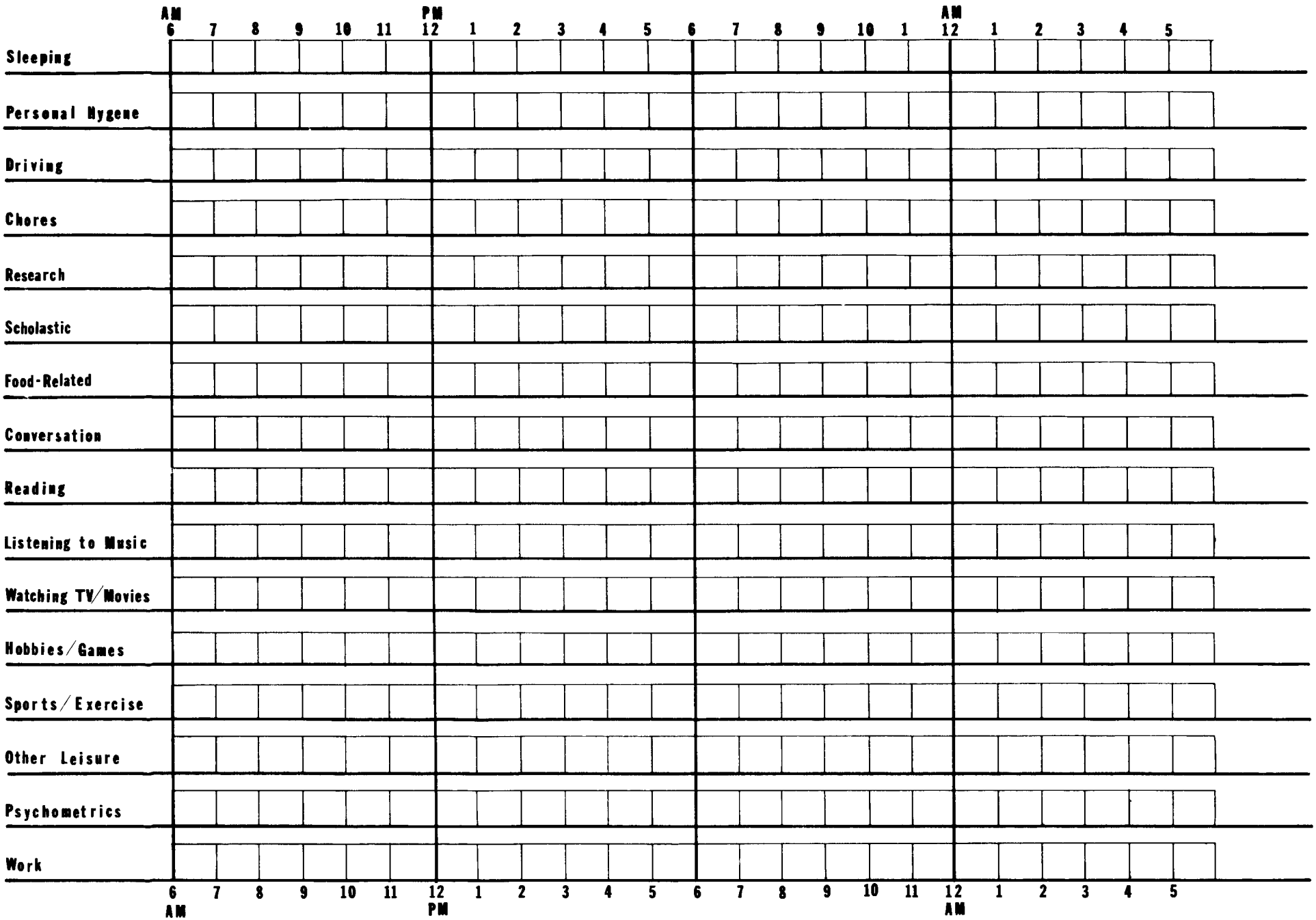
DEFINITIONS FOR THE ACTIVITIES CHART

SLEEPING: in bed with no other activities in progress.
PERSONAL HYGIENE: body care and maintenance other than food and exercise.
DRIVING: any form of transportation.
CHORES: required tasks not falling in hygiene, research, food related, or work; waiting.
RESEARCH: anything immediately related to the setup or execution of experiments or data analysis.
SCHOLASTIC: any form of study, learning, or academic reading.
FOOD RELATED: planning, acquisition, preparation, eating, or food clean up.
CONVERSATION: any vocal communication except lectures or speeches--may frequently occur with other activities.
READING: any reading done primarily for pleasure.
LISTENING TO MUSIC: music deliberately turned on or attended to.
WATCHING TV/MOVIES: where some degree of attention is given to the program.
HOBBIES/GAMES: non-athletic recreation with at least semi-formal rules or procedures.
SPORTS/EXERCISE: produces at least a little perspiration.
OTHER LEISURE: a miscellaneous category for leisure forms not included elsewhere.
PSYCHOMETRICS: working on feedback forms such as the present form.
WORK: any activities required by your employment not fitting other categories; (e.g. administrative, budgets, proposals.)

TASKA

TIME ALLOCATION SAMPLE KEY

side one



5-10	11	12	14	15	16-17

DATE _____ NAME _____

3.4 Assessment of Daily Accomplishments (ADA)

3.4.1 Use of the Assessment of Daily Accomplishment Form

The ADA is recommended for use in both open and closed system simulation runs. It requires approximately five minutes to complete, and should be filled out by each crewman each day after he has ceased working on his experiments for that day.

Since the information provided by this form is not directly quantitative, it is compared visually with the Task Analysis and Expected Timelines to estimate the deviations of both planned accomplishments and actual accomplishments. Information from these forms will also enter into the derivation of an overall productivity estimate for each crewman.

INSTRUCTIONS FOR
ASSESSMENT OF DAILY ACCOMPLISHMENTS

Your plans or goals for carrying out your experiments and related scientific tasks have a significant role in your work. The same is true of your own periodic assessment of your progress toward the completion of these tasks or goals. In a similar fashion, the knowledge of your periodic planning and assessments is valuable to the Man/System research team in that this information provides a meaningful context in which your scientific activities may be viewed. For this reason you are asked to use the ADA form to provide a record of your own daily assessments and plans.

1. List the scientific tasks which you performed today and the approximate percentage of completion of each.
   Example: (1) Calibrated data collection hardware (80%).
   Example: (2) Performed radiological tolerance evaluation on earthworm (40%).

2. List reasons for not accomplishing all the tasks you had planned.
   Example: (1) PCS system maintenance required time allocated for scientific work.

3. List any equipment and habitat features which were specifically helpful during your daily tasks.

4. Outline the tasks you plan to perform tomorrow. Estimate the time required for each and the percentage of the work you expect to be able to complete.
   Example: (1) Perform Cloud Physics experiment No. 6 (8 Hrs. - 100%)

ASSESSMENT OF DAILY ACTIVITIES

NAME _____ DATE _____

1.

SCIENTIFIC TASKS PERFORMED TODAY	ESTIMATED TIME SPENT	PERCENT COMPLETE

2.

REASONS ALL TASKS PLANNED FOR TODAY WERE NOT COMPLETED

3.

ESPECIALLY HELPFUL PCS OR EQUIPMENT FEATURES

4.

SCIENTIFIC TASKS PLANNED FOR TOMORROW	ESTIMATED TIME REQUIRED	ESTIMATED PERCENT OF COMPLETION

3.5 The Debriefing

3.5.1 Nature and Use of the Debriefing

The total debriefing process is composed of three definitive sections, each with a different procedure, followed by a final summary and estimation. The three sections are:

1. NONDIRECTIVE (Individual)
2. EXPLORATION OF ANOMALIES (Individual)
3. SYSTEMATIC EXPERIMENT DISCUSSION (Group)

The function of the nondirective section is to receive spontaneously volunteered information or evaluation from the crewman, with minimum interviewer introduced bias. This section will be subjected to content analysis to derive estimates of the crewman's attitudes, effectiveness, and involvement in and toward the mission. This section is not particularly relevant to open system simulation. It should require thirty to forty-five minutes, on the average, and should be carried out immediately after leaving the PCS, prior to interaction with anyone. The interviewer should open the session by asking the crewman to comment on or discuss whatever things, events, or procedures seem relevant or important to him. The interviewer should acknowledge the crewman's comments affirmatively, but should be extremely cautious to avoid biasing the interview by responding negatively (frowning) to one type of comments and positively (smiling) to another.

The function of the second debriefing section, the exploration of anomalies, is to provide interaction with the crewman, individually, about points of information noted on visual inspection of several of the Man/Systems instruments (e.g. TASK, GPL Effectiveness Scale, deviations from the Task Analysis, deviations from the Expected Timelines, and Critical Incidents). The data from this part of the interview will be used to fill in specific details of these data points. This section of the debriefing should last approximately one hour. It may be delayed 12 to 18 hours after egress from the PCS. It is recommended for both open and closed system simulation runs. The interviewer should have notes which integrate the points raised by the data instruments into a reasonable number of anomalies. He should present these, one at a time, seeking the crewman's input as to additional details about, or explanations of these anomalies.

The third section of the debriefing is an open, comprehensive, systematic discussion of the experiments. Generally, the experiments are discussed one at a time, covering all aspects of each experiment. Those present should include all crewmen, the NASA Crew Chief, the NASA PCS Test Conductor, and the UAH PCS Man/Systems Coordinator. The systematic discussions should include the following:

- Preparation for the run, including hardware interface development, constructions on experiments, discussions about the amount of research planned, and the effectiveness of the interchange of information between the investigator and PCS related NASA personnel
- The impact of general PCS procedures on each experiment
- The impact of PCS design on each experiment, including space, location, interfaces, physical support systems, and maintenance capabilities

- o The extent and effectiveness of experimenter cross participation, including the sharing of facilities.
- o The role of the NASA Crew Chief

The effectiveness of this section of the debriefing will be enhanced by prior preparation on the part of each of the participants. Optimum preparation would include written notes. Adequate preparation must also be made to satisfactorily record on tape the discussion of such a large group.

3.6 The Minnesota Multiphasic Personality Inventory
The 16 Personality Factor Inventory
The Edwards Personal Preference Schedule

3.6.1 The Use of These Instruments

These instruments should be given once to each crewman at least 30 days prior to his mission. The three instruments together require approximately four hours to complete. The deadline for their return, after being sent to the crewman, should allow him long enough to schedule a block of time to work on them without distraction, and he should be encouraged to do so.

Each of these instruments is copyrighted and commercially available, so the instruments themselves are not included in this document. The instructions for their use are a part of the instruction booklets, and answer sheets may be obtained with the booklets. The following are the suppliers of these tests:

The Minnesota Multiphasic Personality Inventory and
The Edwards Personal Preference Inventory
The Psychological Corporation
304 East 45th Street
New York, New York 10017

The 16 Personality Factor Questionnaire
Institute for Personality and Ability Testing
1602-04 Coronado Drive
Champaign, Illinois

PHASE B

VOL. II C

MAN/SYSTEMS DATA HANDLING

SOFTWARE DESCRIPTION

Table of Contents

PHASE B/VOL. II C

MAN/SYSTEMS DATA HANDLING SOFTWARE

1.0 THE MAN/SYSTEMS DATA BANK

The key element of a comprehensive computerized data analysis system for the Man/System data base is the data tapes. The system recommended uses one primary data tape for each experimental run. The Man/Systems coordinator for each experiment run will coordinate the assembly of all the data from that run into a comprehensive data tape for that run. The various kinds of data from each run will be placed in a standard form and in a standard order or location on such a data tape. These tapes form the data bank, which is a growing base of information for the user, since, knowing the standard location and format of the data files on the tapes, he may access any file from any run.

It is recommended that a cluster of programs be developed, one for each of the data types contained on these tapes. Each of these programs would include the ability to access the appropriate data files from any of the data tapes in such a fashion that the user would not even have to know the locations and formats of these data files. The nature of these programs is discussed in Sec. 2.1.

The data tape for each run will contain many types of information or data. Each of these will be located in a file on the tape. The location and contents of these files are described in the next section.

1.1 TABLE OF DATA TAPE CONTENTS

01	ACCESS TABLE (internal use)
02	TABLE OF CONTENTS (user information)
03	RUN PARAMETERS TABLE
04	RUN DESCRIPTIVE COMMENTS
05-07	empty expansion files
08	BIOGRAF (crewman 1...n)
09	GPLERS (crewman 1...n)
10	TASKAN (crewman 1...n)
11	EOT (crewman 1...n)
12	CI (crewman 1...n)
13	HUG & PI (crewman 1...n)
14	ADA (crewman 1...n)
15-18	empty expansion files
19	MMPI (crewman 1...n)
20	16PF (crewman 1...n)
21	EPPS (crewman 1...n)
22-25	empty expansion files
26	TASK (crewman 1...n)
27	TASKSP (crewman 1...n)
28	OPA (crewman 1...n)
29-32	empty expansion files
33	BITS
34	BITSSP
35-38	empty expansion files

TABLE OF DATA TAPE CONTENTS (CONTINUED)

1.2 Description of Files on Data Tape

(01) ACCESS TABLE - Upon call from one of the programs for a specified run data tape the first file, containing the ACCESS TABLE, of that tape would be copied into a drum file. The ACCESS TABLE will contain information used to direct the copying of the remaining files of that tape into temporary drum files with standard names, known to the various Man/Systems programs. The contents of this file will therefore be in a form which will identify the locations of files on this tape to the program directing the copying activity. It is expected that the ACCESS TABLE will require less than 100 records.

(02) TABLE OF CONTENTS - This table will contain descriptive information regarding the contents of the tape, which will be available to the user via the various Man/Systems programs. Due to the unique character of different experiments, some data tapes will not fill all the projected data files. The user may ascertain from this table which data files on this tape actually contain data. It is expected that the number of records contained in this file will be approximately equal to the number of projected files.

(03) RUN PARAMETERS TABLE - This file will contain data in a standard format specifying the significant characteristics of this run according to a finite set of relevant parameters. The following are typical records:

132 = CUBIC FEET PER MAN

2 = EXTERNALLY INTRODUCED STRESS LEVEL

4 = NUMBER OF CREWMEN

948 = HOURS DURATION OF MISSION

13 = TYPE OF WORK IN MISSION

4 = TYPE OF FORMAL LEADERSHIP STRUCTURE

2 = EXTENT OF MISSION TRAINING

It is anticipated that this file will contain approximately 50 records.

(04) RUN DESCRIPTIVE COMMENTS - This file will contain alphameric comments about the nature or conditions of the experiment other than those formally expressed in the RUN PARAMETER TABLE (e.g. One crewman left during the first day because of a family crisis. His data is completely excluded from the data bank except for BITS records 01-63). It is anticipated that this file will contain less than 100 records.

(08) BIOGRAF - This file will contain, in tabular form, standard biographical data about each crewman. Within the data bank, each crewman will be identified by the name of the run he in which participated (RUNAME), and a number designating which crewman he was in that run. This will be included in the BIOGRAF information. Within this file there will be a complete BIOGRAF table for each crewmember. These tables will be located within the file in the order of the crewman's number so that the first table in the BIOGRAF file will be for crewman RUNAME 1, etc. It is anticipated that there will be approximately 50 records of data for each crewman in this file.

(09) GPLERS - This file will contain data derived from the GPL effectiveness Rating Scale. Data within the file will be

of two types. First will be the intermediate or derived factor scores for each crewman, second will be the unprocessed question answers for each crewman. The derived factor scores for each crewman will be in the form of an array of alphanumeric information; the arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). It is anticipated that the array for each crewman will consist of approximately 25 records. The second set of arrays in this file will be located in the same order and will contain the unprocessed answers from the GPLERS. There will be a 2 record array of these answers for each crewman.

(10) TASKAN - The TASKAN file will contain data derived from the observations of the discrepancies between planned procedures and actual procedures followed by each crewman. There will be an array of data for each crewmember and these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). It is anticipated that the array for each crewman will consist of less than 50 records.

(11) EOT - This file will contain data derived from the observations of the discrepancies between the expected timelines and actual timelines followed by each crewman. There will be an array of data for each crewmember, and these arrays will be sequentially located within the EOT file according to the identity number of the crewman, (see (08)). It is anticipated that the array for each crewman will contain less than 100 records.

(12) CI - The CI file will contain data derived from

the Critical Incidents recorded for each crewman. There will be an array of data for each crewmember, and these arrays will be sequentially located within the CI file according to the identity number of the crewman, (see (08)). It is anticipated that the array for each crewman will contain less than 100 records.

(13) HUG&PI - This file will contain data from the HUG&PI form. Data within the file will be of two types. First, will be the intermediate or derived factor scores for each crewman; second, will be the unprocessed question answers for each crewman. The derived factor scores for each crewman will be in the form of an array of alphanumeric information; the arrays will be sequentially located in the file according to the identity number of the crewman, (see (08)). It is anticipated that this array for each crewman will contain approximately 25 records. The second set of arrays within the file will be located in the same order and will contain the unprocessed answers from the HUG&PI. There will be a 2 record array of answers for each crewman.

(14) ADA - This file will contain information derived from the ADA form. This information will probably be coded in free field English. There will be an array for each crewman; these arrays will be located sequentially within the file according to the identity number of the crewman, (see (08)). Each array will probably consist of about 20 records per day.

(19) MMPI - The MMPI file will contain data from

this inventory. Data within the file will be of two types. First will be the standardized scores for each crewman derived from the answers; second will be the unprocessed answers for each crewman. The standardized scores for each crewman will be in the form of an array of alphanumeric information; these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each crewman will contain 6 records. The second set of arrays within the file will be located in the same order and will contain the unprocessed answers from the MMPI. There will be a 10 record array for each crewman.

(20) 16PF - This file will contain data from the 16PF inventory. Data within the file will be of two types. First will be the standardized scores for each crewman; second will be the unprocessed answers for each crewman. The standardized scores for each crewman will be in the form of an array of alphanumeric information; these arrays will be located sequentially within the file according to the identity number of the crewman, (see (08)). The array for each crewman will contain 10 records. The second set of arrays within the file will be located in the same order and will contain the unprocessed answers from the 16PF. There will be a 4 record array for each crewman.

(21) EPPS - This file will contain data from the EPPS inventory. Data within the file will be of two types. First will be the standardized scores for each crewman derived from the answers; the second will be the unprocessed answers for each crewman. The standardized scores for each crewman will be in the form of an array of alphanumeric

information; these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each crewman will contain 8 records. The second set of arrays will contain the unprocessed answers and will be located in the same order within the file. There will be a 6 record array for each crewman.

(26) TASK - This file will contain data from the TASK form. Data within this file will be of two types. First will be a set of descriptive statistics for each crewman; second will be the unprocessed numeric data from the form for each crewman. The descriptive statistics for each crewman will be in the form of an array of alphanumeric information; these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each crewman will contain approximately 20 records. The second set of arrays within the file will be located in the same order and will contain the unprocessed data. There will be an array for each crewman containing 16 records for each day including 14 days before the run, each day of the run, and 14 days after the run. Thus, the array for each crewman will contain approximately 560 records.

(27) TASKSP - This file will contain the data from side B (state and productivity) of the TASK. Data in this file will be of two types. The first will be descriptive statistics for each crewman; the second will be the unprocessed data. The descriptive statistics for each crewman will be in the form of an array of alphanumeric information; these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each

crewman will contain approximately 10 records. The second set of arrays will be the unprocessed data from these forms and will be located in the same order within the file. There will be an array for each crewman containing 2 records for each day, including 14 days prior to the run, each day of the run, and 14 days after the run. Thus, the array for each crewman will contain approximately 70 records.

(28) OPA - This array will contain data from the OPA procedure. It is expected that the data within this file will be of two types. The first will be a set of summary descriptive statictics for each crewman; the second will be the unprocessed data from the procedure. The summary statistics for each crewman will be in the form of an array of alphanumeric information; these arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The number of records in each array will probably be less than 25. The second set of arrays will contain the unprocessed data and will be located in the same order within the file. There will be an array for each crewman which will probably contain less than 50 records for each use of the procedure, which will probably be used about 4 times for each crewman.

(33) BITS - This file will contain only two arrays. The first array will contain information about the BITS tree structure needed by the BITS ANALYZER program. This array will consist of approximately 2000 records. The second array will contain the data records produced by the BITS OPERATING program. There will be about 240 of these records for each crewman for each day of the run.

(34) BITSSP - This file will contain a single array in which will be stored the data records produced by the state and productivity element of the BITS OPERATING program. There will be 240 of these records for each day of the run.

(39) VIDEO TAPE LOCATION INFORMATION (VIDLOC) - This file will contain a table of information which will allow the various Man/Systems programs to direct the user to the exact location, on a specific video tape, of the video recording of a specified event or time. The format and size of this table cannot be specified at this time since the criteria for selective video recording during the run are not known. A guess would suggest that there will be one record for each instance of recording, and that there will be approximately 50 such instances for each day of the run.

(40) AUDIO TAPE LOCATION INFORMATION (AUDLOC) - This file will contain a table of information which will allow the various Man/System programs to direct the user to the exact location, on a specific audio tape, of the audio recording of a specified time during the run. If audio recording is continuous, the only tabular information will be the initiation time of each tape so that there should be approximately 12 records for each day of the run.

(41) SYSTEM DATA TAPE LOCATION (DATLOC) - This file will contain a table of information which will allow the various CONFIN programs to direct the user to the exact location, on a specific system data tape, of the data recorded at a specified time during the run.

Since the exact nature of the data tapes is not presently known, the format for this data is not specified.

(46) DBRF1 - This file will contain two kinds of information from the type 1 debriefing. The first is a set of descriptive statistics, for each crewman, derived from the transcript of the debriefing. The second is the transcript of the type 1 debriefing of each crewman. The descriptive statistics for each crewman, derived largely from content analysis, will be in the form of an array of alphanumeric information, and the arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each crewman will contain approximately 12 records. The second set of arrays will contain, in free field English, the transcript of the type 1 debriefing of each crewman and will be located in the same order within the file. There will be approximately 500 records for each crewman.

(47) DBRF2 - This file will contain information derived from the type 2 debriefing. This information will be in the form of an array of free field English for each crewman. These arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). The array for each crewman will probably contain less than 50 records.

(48) COMMENTS ON CREW (CREWCO) - This file will contain certain information regarding the crew that is not recorded in other forms. This information will be in the form of an array of free

field English for each crewman, and the arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)). There will be approximately 50 records for each crewman.

(53) SYSTEMS ANOMALIES LISTING (SAL) - This file will contain the list of systems anomalies reported by both the crewmen and the observers. This information will be in the form of an array of formatted English for each crewman and the combined observers. These arrays will be sequentially located within the file according to the identity number of the crewman, (see (08)), followed by the array for observers. It is anticipated that each array will contain less than 75 records.

(54) DBRF3 - This file will contain information derived from the type 3 debriefing. This information will consist of summaries of the primary points of the debriefing and will be in the form of an array of free field English. It is anticipated that there will be less than 500 records.

2.0 THE MAN/SYSTEMS PROGRAMS

2.1 Data Examination Programs

It is proposed that a cluster of data examination programs be developed. There would be one of these programs for each of the data sets represented by a file in the data tapes. The central function of each of these programs would be to examine this particular data set on each or all of the existing data tapes. During the initial handling of each of these sets of data, this program would check the raw data for format accuracy and store it in a drum file in proper format for transfer to the data tape being set up for that experiment run. It would also derive the standardized or summary information and prepare it for storage in the same output file.

In subsequent usage, the program would allow the user to extract information he specifies from the relevant files of whatever runs he specifies. The information he could obtain would consist of part or all of the raw data, or part or all of the derived data, and in some cases he could use the program to derive, interactively, entirely new scores or summaries from the raw data. In each of these cases the extracted information could be printed and/or placed in temporary storage for direct use by more comprehensive analysis programs.

2.2 The Manager Program

The manager program would serve as a link among the other programs and between these other programs and the data tapes. Its primary means of accomplishing this would be through directory tables which it maintains, and from which it passes information to the programs

accessed through the manager program. The manager program would serve as the user's entry point to any of the other programs. In addition, it could provide the user directly with certain information including the names, nature of, and instructions for entry into the cluster of data extraction and analysis programs, and the names and nature of all of the runs currently represented in the data bank.

The typical sequence of use of the complete data bank system might be as follows: The user, working from a demand terminal, would start a bootstrap program which is permanently located on drum. This bootstrap program would copy in, from tape, the set of programs. These would then be available as elements of a program file. The bootstrap program would then initiate the execution of the manager program. Via the manager program, the user would enter the data examination program in which he is interested and call for the extraction of certain of the data handled by that program. He would also specify the run or runs from which he wanted that data. The data examination program would, by using directory tables, decode his request into a call for the copying of the appropriate experiment run data tape, and would read the relevant data file. The user might then specify that the extracted information is to be saved in a temporary drum file for access by an analysis program. He could then return to the manager program and enter another data examination program. Through this program he could extract a different set of data from the same or different runs, again retaining the information obtained in a temporary file. Returning again to manager he could enter an analysis program, which he could instruct to use the files just formed as the input data

for the analysis.

The directory tables associated with the manager program serve a most important role in the system. Through the use of such updated tables, the programs in the system can handle the entire burden of locating and accessing any desired data. The user is only required to be able to specify the data he wants in terms of run names, crewman numbers, and data types.

2.3 The Analysis Programs

The analysis programs will be a part of the total cluster of programs, but will operate at a more comprehensive level than the data examination programs. The input to these will usually be data that has been selected, reduced, or abstracted in some ways before being introduced to these programs. Typical kinds of analysis handled by these programs would be plotting, regression analysis, correlation or factor analysis. Most, if not all, of these programs exist presently as routines in the Univac program library. What is required is the development of skeleton programs interfacing these programs with other programs in the system.

3.0 PUNCH CARD FORMATS

3.1 COMPUTER PUNCH CARD FORMAT FOR GPLERS ANSWER SHEETS

COL 01 — TEST NUMBER (ALWAYS 09)
COL 02

COL 03 — CARD SEQUENCE NUMBER FOR THIS
COL 04 — ANSWER SHEET (01-02)

COL 05 — NAME OF EXPERIMENT (ALWAYS SIX NUMBERS
COL 06 — OR LETTERS)
COL 07
COL 08
COL 09
COL 10

COL 11 — IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)

COL 12 — SEX OF CREWMAN (M OR F)

COL 13 — ANSWERS

CARD 01,	COLS 13-19,	SEVEN RATING ANSWERS (E, V, F, W, OR P IN EACH COLUMN)
	COLS 20-69	PLUS OR MINUS ANSWERS FOR FIRST FIVE ROWS OF ANSWER SHEET, (+ OR-OR 0 IN EACH COLUMN)
CARD 02,	COLS 13-62	PLUS OR MINUS ANSWERS FOR LAST FIVE ROWS OF ANSWER SHEET

3.2 COMPUTER PUNCH CARD FORMAT FOR HUG&PI ANSWER SHEETS

COL 01	TEST NUMBER (ALWAYS 13)
COL 02	
COL 03	CARD SEQUENCY NUMBER FOR THIS
COL 04	ANSWER SHEET (ALWAYS 01)
COL 05	NAME OF EXPERIMENT (ALWAYS SIX NUMBERS
COL 06	OR LETTERS)
COL 07	
COL 08	
COL 09	
COL 10	
COL 11	IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)
COL 12	SEX OF CREWMAN (M OR F)
COL 13-68	ANSWERS, ONE NUMBER (1-7) IN EACH COLUMN, IN THE FOLLOWING ORDER COL 13, FIRST QUESTION, LEFT ANSWER COL 14, FIRST QUESTION, RIGHT ANSWER COL 15, SECOND QUESTION, LEFT ANSWER

3.3 COMPUTER PUNCH CARD FORMAT FOR MMPI ANSWER SHEETS

COL 01 — TEST NUMBER (ALWAYS 19)
COL 02

COL 03 — CARD SEQUENCE NUMBER FOR THIS
COL 04 — ANSWER SHEET (01-10)

COL 05 — NAME OF EXPERIMENT (ALWAYS SIX NUMBERS
COL 06 — OR LETTERS)
COL 07
COL 08
COL 09
COL 10

COL 11 — IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)

COL 12 — SEX OF CREWMAN (M OR F)

COL 13 — ANSWERS (T OR F IN EACH COLUMN)
CARD 01, COLS 13-72, ANSWERS 1-60
CARD 02, COLS 13-72, ANSWERS 61-120
CARD 03, COLS 13-72, ANSWERS 121-180
CARD 04, COLS 13-72, ANSWERS 181-240
CARD 05, COLS 13-72, ANSWERS 241-300
CARD 06, COLS 13-72, ANSWERS 301-360
CARD 07, COLS 13-72, ANSWERS 361-420
CARD 08, COLS 13-72, ANSWERS 421-480
CARD 09, COLS 13-72, ANSWERS 481-540
CARD 10, COLS 13-37, ANSWERS 541-566

3.4 COMPUTER PUNCH CARD FORMAT FOR 16PF ANSWER SHEETS

COL 01 COL 02	TEST NUMBER (ALWAYS 20)
COL 03 COL 04	SEQUENCE NUMBER FOR THIS ANSWER SHEET (01-04)
COL 05 COL 06 COL 07 COL 08 COL 09 COL 10	NAME OF EXPERIMENT (ALWAYS SIX NUMBERS OR LETTERS)
COL 11	IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)
COL 12	SEX OF CREWMAN (M OR F)
COL 13	ANSWERS (A OR B OR C IN EACH COLUMN) CARDS 01, COLS 13-62, ANSWERS 001-050 CARDS 02, COLS 13-62, ANSWERS 051-100 CARDS 03, COLS 13-62, ANSWERS 101-150 CARDS 04, COLS 13-49, ANSWERS 151-187

3.5 COMPUTER PUNCH CARD FORMAT FOR EPPS ANSWER SHEETS

COL 01	TEST NUMBER (ALWAYS 21)
COL 02	
COL 03	CARD SEQUENCE NUMBER FOR THIS
COL 04	ANSWER SHEET (01-06)
COL 05	
COL 06	
COL 07	
COL 08	
COL 09	
COL 10	
COL 11	IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)
COL 12	SEX OF CREWMAN (M OR F)
COL 13	ANSWERS (A OR B IN EACH COLUMN) CARD 01, COLS 13-52, ANSWERS 001-040 CARD 02, COLS 13-47, ANSWERS 041-075 CARD 03, COLS 13-52, ANSWERS 076-115 CARD 04, COLS 13-47, ANSWERS 116-150 CARD 05, COLS 13-52, ANSWERS 151-190 CARD 06, COLS 13-47, ANSWERS 191-225

3.6 COMPUTER PUNCH CARD FORMAT FOR TASKA FORMS

COL 01 COL 02	TEST NUMBER (ALWAYS 26)
COL 03 COL 04	CARD SEQUENCE NUMBER FOR THIS ANSWER SHEET (01-16)
COL 05 COL 06 COL 07 COL 08 COL 09 COL 10	EXPERIMENT NAME (ALWAYS SIX NUMBERS OR LETTERS)
COL 11	IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)
COL 12	SEX OF CREWMAN (M OR F)
COL 13	BLANK
COL 14	DAY OF WEEK (SUN. = 1, MON. = 2, etc.)
COL 15	BEFORE, DURING, OR AFTER EXPERIMENT (B, D, OR A)
COL 16 COL 17	SEQUENCE NUMBER OF DAY (01-14 BEFORE, 01-07 DURING, 01-14 AFTER)
COL 18	BLANK
COL 19	ANSWERS (0 OR 1 IN EACH COLUMN) CARD 01, COLS 19-42, SLEEPING (EACH BOX) CARD 02, COLS 19-42, PERSONAL HYGIENE (EACH BOX) CARD 03, COLS 19-42, DRIVING (EACH BOX) CARD 04, COLS 19-42, CHORES (EACH BOX) CARD 05, COLS 19-42, RESEARCH (EACH BOX) CARD 06, COLS 19-42, SCHOLASTIC (EACH BOX) CARD 07, COLS 19-42, FOOD-RELATED (EACH BOX) CARD 08, COLS 19-42, CONVERSATION (EACH BOX) CARD 09, COLS 19-42, READING (EACH BOX) CARD 10, COLS 19-42, LISTENING TO MUSIC (EACH BOX) CARD 11, COLS 19-42, WATCHING TV/MOVIES (EACH BOX) CARD 12, COLS 19-42, HOBBIES/GAMES (EACH BOX) CARD 13, COLS 19-42, SPORTS/EXERCISE (EACH BOX) CARD 14, COLS 19-42, OTHER LEISURE (EACH BOX) CARD 15, COLS 19-42, PSYCHOMETRICS (EACH BOX) CARD 16, COLS 19-42, WORK (EACH BOX)

3.7 COMPUTER PUNCH CARD FORMAT FOR TASKSP FORMS

COL 01 COL 02	TEST NUMBER (ALWAYS 27)
COL 03 COL 04	CARD SEQUENCE NUMBER FOR THIS ANSWER SHEET (ALWAYS 01)
COL 05 COL 06 COL 07 COL 08 COL 09 COL 10	EXPERIMENT NAME (ALWAYS SIX NUMBERS OR LETTERS
COL 11	IDENTIFICATION NUMBER OF CREWMAN (ONE NUMBER)
COL 12	SEX OF CREWMAN (M OR F)
COL 13	BLANK
COL 14	DAY OF WEEK (SUN. = 1, MON. = 2, Etc.)
COL 15	BEFORE, DURING, OR AFTER EXPERIMENT (B, D, OR A)
COL 16	SEQUENCE NUMBER OF DAY
COL 17	(01-14 BEFORE, 01-0? DURING, 01-14 AFTER)
COL 18	BLANK
COL 19	ANSWERS (NUMBER (0-7) IN EACH COLUMN) COL 19-42, STATE NUMBERS
	COL 43, BLANK
	COL 44-62, PRODUCTIVITY NUMBERS

4.0 OPERATIONAL DATA EXAMINATION PROGRAMS

Four programs have been written for inclusion in this report. These programs perform certain of the data analysis tasks specified for the Man/Systems programs. All four of these programs operate interactively via a remote demand terminal, processing data located in drum files. They are designed to run on a UNIVAC 1108 system using EXEC 8 and FORTRAN V. These four programs analyze the data from the following sources:

(1.) Binary Interval Time Sample Procedure

(2.) Minnesota Multiphasic Personality Inventory

(3.) 16 Personality Factor Inventory

(4.) Edwards Personal Preference Schedule

These programs are fully operational, and in addition to the following general descriptions of them, the following documents are forwarded with this report:

(1.) The UAH Man/Systems Phase B Programs Document Folder (5 copies)

This folder contains for each program,

(a.) A complete listing of the Fortran V symbolic element and comments.

(b.) A fully detailed flowchart of the symbolic element.

(c.) A complete index of the variable and label names within the symbolic element.

(2.) A set of punched cards containing the Fortran V symbolic element of each program. (1 set)

4.1 BITSER

BITSER is a conversational analysis program which allows the user total flexibility in directing the examination of the BITS data. Because of the vast number of questions which may be asked about the data, BITSER has been structured to allow the user to dynamically define these questions. The printed results of the initial questions may immediately suggest additional questions.

For a typical seven day experimental run there will be 1680 records or lines of data, each representing one-tenth of one hour during the run, and each containing information about the activities of each crewman. The user may want to know how many, or what percentage, of these samples contain the occurrence of a certain event, such as 'crewman one talking to the watch director about his experiment.' To determine this the user would type in the crewman's code name and the branch combination information which defines this activity. This would form a "mask" which would be compared with each of the data records, identifying or counting all those that contain the same information as the mask. If the user was interested in the occurrences of this event during a more limited time period, say, day 2, he could specify a "range" of the data which would be searched. He could further specify whether the program should print only the total number and percent of lines containing this activity, or would also print all of the line numbers themselves, which is equivalent to the actual clock times of the occurrences of this activity.

The description to this point reflects only the most fundamental capabilities of the program. The program also includes the

capability of several analysis and utility tasks, each called or cued by alphanumeric mnemonics. Generally the analysis tasks include the following:

(1.) Mask construction

(2.) Search range definition

(3.) Output contents definition

The utility activities include the following:

(1.) Branch label listing

(2.) Data line to run clock time conversion

(3.) Run clock time to data line conversion

(4.) Parameter modification or correction

The analysis activities are interactive with the user, allowing him to specify the types and parameters of analysis. The user constructs "masks" made up of combinations of the branches of the trees used in the original acquisition of the data. An example of such a combination would be:

Crewman: Red

Location: Room A, doorside

Eyes: On work materials

Ears: Music present

Hands: On drink utensil

In order to locate or count such a combination, if it exists, the BITSER user constructs a mask containing that combination. In the same way masks may be formed for any combination.

After one or more such mask has been formed, the user may define a "range" which will limit the search for this combina-

tion to certain lines, or times. This range can be as large as the entire data file, as small as a single line, or may define subsets of time, such as, "hour 8.0 to hour 14.5, all days".

Output contents definition consists of user supplied parameters specifying the type of output desired. The output may be as extensive as a listing of all the endpoint labels for all the crewmen for every matching line found, which would provide a complete picture of the activities at those times. It may be more limited, providing the endpoint labels of specified trees for specified crewmen, or a complete list of the line numbers or times matching the mask, or only the number and percent of matching samples.

After the user has formed one or more masks, specified a range or ranges, and defined the desired output, he may direct the search and printing to proceed. As this activity is completed, control is returned to the user to initiate further questions.

The utility tasks are functions to aid the user in the analysis tasks outlined above. The branch label listing function causes the program to echo to the user a complete picture of the mask he has constructed, allowing him to check it for accuracy. The next two utility routines convert back and forth between raw data line numbers and actual run clock time. Parameter modification allows the user to edit specific parameters he has entered without having to recycle all the way back to the beginning of an activity. The parameters which may be so edited include masks, range definitions, and output contents definitions.

The BITSER is designed to be used by persons with no knowledge of computer programming. It contains a tutoring routine for the new user. This routine introduces the general sequence of activities within the program, the program commands and their syntax, and explanations of diagnostic messages. It is assumed that the user is familiar with the BITS procedure and the concepts of trees and branches.

This program is designed for, and probably limited to, operation from a demand computer terminal interacting with a Univac 1108 system with Exec 8 and Fortran V. In its present configuration it will handle UAH BITS data, that is 9 trees of 3 branch levels each. It may, however, be reconfigured to handle less restricted data.

4.2 MMPIER

This program derives the standardized 't' scores from the answers a person gives on the MMPI. The answers may be punched into cards directly from the answer sheets, following the format given in Sec. 3.3. There will be 10 cards for the answer sheet of each person. The program will process as many card punched answer sheets as desired in one run, printing out the results of each one as it goes. The cue used for the normal termination of the program is a sentinel card (99 in cols 1-2) following the last answer card for the last person. The information from these cards may be stored as records in a tape file before processing. In this case, the tape file should be copied into a drum file called "MMPIDATA" before the program is run. If run interactively, the program solicits information as to whether

the data is to be read from cards or drum file. If it is run as a batch run, a card with either a '1' (for cards) or a '2' (for drum file) must be inserted into the runstream before the first data card.

Typical output of the program is shown on the next page, where "BIOBSA" is the name of the experiment, and "1" is the identification number of the crewman.

********** ********** **********

THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY

BIOBSA SUBJECT 1 FEMALE

VALIDITY 61	CORRECTION 51
HYPOCHONDRIASIS 39	DEPRESSION 41
HYSTERIA 49	PSYCHOPATHIC DEVIANCY 56
MASCULINITY-FEMININITY 46	PARANOID 50
PSYCHASTHENIA 37	SCHIZOPHRENIA 47
HYPOMANIA 61	SOCIAL INTROVERSION 38

********** ********** **********

4.3 16PFER

This program derives the "standard ten" (STEN) scores from the answers a person gives on the A form of the 16PF. The answer may be punched into cards directly from the answer sheets, following the format given in Sec. 3.4. There will be four cards for the answer sheet of each person. The program will process as many card punched answer sheets as desired in one run, printing out the results of each one as it goes. The cue used for the normal termination of the program is a sentinel card (99 in cols 1-2) following the last answer card for the last person. The information from these cards may be stored as records in a tape file before processing. In this case, the tape file should be copied into a drum file called "16PFDATA" before the program is run. If run interactively, the program solicits information as to whether the data is to be read from cards or drum file. If the program is run as a batch run, a card with either a '1' (for cards) or a '2' (for drum file) must be inserted into the run-stream before the first data card.

Typical output of the program is shown on the next page, where "BIOBSA" is the name of the experiment, and "1" is the identification number of the crewman.

********** ********** **********

THE 16 PERSONALITY FACTOR INVENTORY

BIOBSA SUBJECT 1 FEMALE

OUTGOING	4	MORE INTELLIGENT	6
EMOTIONALLY STABLE	5	ASSERTIVE	8
HAPPY-GO-LUCKY	6	CONSCIENTIOUS	2
VENTURESOME	9	TENDER-MINDED	7
SUSPICIOUS	3	IMAGINATIVE	9
SHREWD	7	APPREHENSIVE	5
EXPERIMENTING	10	SELF-SUFFICIENT	7
CONTROLLED	6	TENSE	2

********** ********** **********

4.4 EPPSER

This program derives the percentile scores from the answers a person gives on the EPPS. The answers may be punched into cards directly from the answer sheets, following the format given in Section 3.5. There will be six cards for the answer sheet for each person. The program will process as many card punched answer sheets as desired in one run, printing out the results of each one as it goes. The cue used for the normal termination of the program is a sentinel card (99 in cols 1-2) following the last answer card for the last person. The information from these cards may be stored as records in a tape file before processing. In this case, the tape file should be copied into a drum file called "EPPSDATA" before the program is run. If run interactively, the program solicits information as to whether the data is to be read from cards or from drumfile. If the program is run as a batch run, a card with either a '1' (for cards) or a '2' (for drum file) must be inserted into the runstream before the first data card.

Typical output of the program is shown on the next page, where "BIOBSA" is the name of the experiment, and "1" is the identification number of the crewman.

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EDWARDS PERSONAL PREFERENCE SCHEDULE

BIOBSA SUBJECT 1 FEMALE

ACHIEVEMENT	83	DEFERENCE	27
ORDER	6	EXHIBITION	97
AUTONOMY	89	AFFILIATION	35
INTRACEPTION	89	SUCCORANCE	1
DOMINANCE	56	ABASEMENT	5
NURTURANCE	24	CHANGE	81
ENDURANCE	72	HETEROSEXUALITY	87
AGGRESSION	55	CONSISTENCY SCORE	2

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